NOVEMBER 1951

THE CLASSICAL JOURNAL

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Felix Feles

Amid the catholicity of releases reaching the Editor, there comes from the American Feline Society, Inc. announcement of Nov. 4–10 as *National Cat Week*. Since the alert Latin teacher will be eager to observe this appropriately, attention is called to the description of *felis catus* in the JOURNAL of November, 1946, p. 77. The learned author of this has points in common with the animal; both are notable Epicureans, individualistic, belligerent, picturesquely vocal.

A shortcoming of the classical tradition is the minor part played in it by the cat. Even Socrates, we regret to say, swore by the dog. It was a dog that endangered the town and country mice and disillusioned the latter; though in Plautus' *Rudens* 748 *faelis virginalis* was a mouser, but with a lupine bias. Several Roman authors assign the proper evaluation of the cat (Herodotus' "tail-waver")—which must, however, have taken a dim view of Anubis—to the Egyptians. The feline whose name was, on a certain public occasion, confused with the Greek word for 'calm' seems to have been rather more mephitic. Puss wore a tunic instead of boots in the Greek proverb.

(*Concluded next page*)

A MESSAGE FROM THE NEW SECRETARY-TREASURER

Moving. The office of the Association arrived in Boulder by van on September 17. As you may imagine it took some days to unpack and get things rolling again, and as this took place during registration and the beginning of classes at the University, we were pretty busy for many days. If some of you failed to have your letters answered quite as promptly as you may have wished, I hope you will understand our difficulties, enhanced by unfamiliarity with the job!

Missing Issues. I have quite a number of letters from subscribers and members about missing issues from last year. I am taking care of these just as fast as I can, but unfortunately certain numbers are entirely absent from our stock. Any requests for these I will be unable to fill until a new supply arrives from the publishers. I sincerely hope that these will all have been taken care of by the time you read this! Please don't hesitate to write me of missing issues.

New Subscribers and Changes of Address. We had the addressograph mailing list up to date on the 30th of September, and on that date the mailing list of over 4000 was run off. Any new subscribers and those whose address change did not reach me by that date will perforce have missed the October issue. If you have, let me know, and when I get the "office supply" myself, I'll send you one. Our subscriptions, as you know, begin in October (for the academic year) or January (for the calendar year). Subscriptions which come in to this office inbetween times are difficult to handle any other way than by filling with back issues, or by waiting until the next starting point. It will be very helpful if you bear this in mind, and it will also assist greatly in the billing!

1951–52 subscriptions. You were all billed for 1951–52 last spring. Many of your renewals have been coming in during the summer and are still coming in. But many more are not in yet. Because of the awkward situation caused by moving during September, it will be best to urge you to get your renewals in to this office NOW. Those that are not in within a month or so will be billed again before the end of the year. Please save us many hours of work, and considerable expense, by sending in your renewal now. You may still use the business reply envelope you have, even though it is addressed to Prof. Korfmacher. He forwards them to me every day! However you do it, do it NOW. You will continue to receive the JOURNAL meantime, for we presume that you have forgotten during the summer, or have purposely delayed until our move was completed. Please make checks out to the Association, to the JOURNAL, or to me. It saves trouble at the bank if you will cease placing Prof. Korfmacher's name on them!

ALL THIS IS URGENT. The move out here was very expensive. We need your subscriptions, and however much we should like to, you know we can't keep on sending the JOURNAL indefinitely without your money! Help the Association by helping this office. Less than half of you have subscribed for 1951–52!

New England, Atlantic States and Pacific States subscribers. Your renewals and subscriptions come to me regularly through your Association offices. Keep them coming.

With best wishes to you, and hopes that you will find this office a prompt and cheerful one to deal with.

JOHN N. HOUGH

FELINES

(from Cover II)

To call some women "catty" is an unjust reflection on the semantics of cats, whose opinions are given explicitly without recourse to innuendo. 'Dog' has always been in the category of opprobrium. There being 21,000,000 cats in the United States, it is the announced policy of this JOURNAL to conciliate them.

Trends and Events

Edited by Dorrance S. White

"HOMELESS STUDY"

THE TREND is almost a half century old, but if a small minority of educators have their way, classroom procedure for teachers of Latin will be radically changed in the future. For it is planned to abolish all home work, . . . *all*, and a teacher will be considered a renegade if he demands it. So says Amy Selwyn in *This Week Magazine* (May 13, 1951; condensed in *Reader's Digest*, Sept., 1951; the "renegade" part mine). On the other hand, 40,000 San Francisco parents were asked their opinion on home work and the majority said that their children weren't getting enough! We suspect that that majority obtains throughout the nation.

Why worry, then? Well, you know what happened to classical studies when the Progressive Educationists got their program going in the 30's. The value of Latin in the minds of parents everywhere has had a tenacious hold; but repeated assaults, with blasts of untrue or half-true statements, do a lot of harm. For example, certain educators proclaimed as fact in 1923 that the results of the Henman Latin Tests showed that no appreciable progress was being made in Latin study after the second year and that third and fourth year work might well be dropped. Your editor made a special study of several thousand of the Henman tests and found that, by the partial-credit method of scoring, third-year students made a 25% gain over the second-year students in the *more difficult half* of the translation test.

The anti-homework educators cite three arguments against home work: first, it wastes the teacher's time in correcting papers and board work; second, it engenders in the child a resentment against school work and study generally in later life; third, the child, when working by himself, learns too slowly and makes too many mistakes.

Quite the contrary, in the first argument, we opine: for isn't it the essence of learning to be given guides, to make a trial, and then feel the elation of accomplishment or to be shown wherein

(*Concluded on Page 98*)

AMERICAN ACADEMY IN ROME

School of Classical Studies

Summer Session, July-August 1952

The 1952 Summer Session of the School of Classical Studies will be held in Rome under the direction of Professor George E. Duckworth of Princeton University. It will run six weeks from July 7th to August 15th.

Conditions for the study of classical antiquity in and about Rome were never more favorable. Apart from the fact that many improvements have been made since the war in the preservation and display of the pre-war archaeological material, opportunity is now given to visit such important new excavations as those in ancient Ostia. The Academy's fine collection of books on all aspects of classical antiquity is available to all students, and the cultural activities of the city as a whole (concerts, opera, art exhibitions, etc.) are flourishing. Suitable accommodations and board in Rome for the duration of the Session may be obtained through the Academy.

The course will be devoted to Roman civilization as exemplified in its surviving material remains in and around Rome and as portrayed in its literature. Emphasis will be placed on study of the monuments *in situ* and the objects preserved in museums. But they will be constantly connected in the instruction with Rome's literary tradition and especially with the great authors of the late Republic and the Augustan Age: Cicero, Virgil, Horace and Livy. Lectures on other aspects of Roman culture will also be given in order to present a reasonably complete picture of the development of Roman civilization from the origins to Constantine. Excursions will be made to Monte Albano, Horace's Sabine Farm, Ostia, and an Etruscan site.

Enrollment will be limited to twenty-two students. Applications for admission must be received by the Academy's New York office not later than March 1, 1952. Basic expenses including tuition, accommodations, board, and cabin class transportation from New York and return may be estimated at $1,000. As in the past, holders of scholarships from regional classical associations will have the tuition fee of $100 remitted.

Requests for details should be addressed to:

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THE CLASSICAL JOURNAL

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A Partial Answer to an Inevitable Question

Roman Elementary Mathematics The Operations

J. Hilton Turner

Mr. Turner, lately of the University of Vermont, is now at Heidelberg College. He is a graduate of the University of Toronto (B.A., 1940) and the University of Cincinnati (Ph.D., 1944). Before going to Vermont he taught at Bishop's College School, Lennoxville, Quebec, and headed the Latin Department of the McCallie School in Chattanooga. His special interest, of which this article is an illustration, is life among the Romans.

"HOW DID THE ROMANS work problems with their numerals?" This question or one like it must be at least an annual experience in the life of most Latin teachers. Moreover, it is by no means a simple one to answer. First, information is not easy to find. In the notes attached to this article will be found only a small part of the relevant literature.[1] Yet even of this hand-picked fraction there is little that could be called readily accessible. Among the standard handbooks there are two groups which might be expected to contain the desired information, histories of mathematics and books on Roman private antiquities. But unfortunately, with one or two exceptions, the former are impressed chiefly by the Roman's lack of interest in theoretical mathematics, the latter are content with a few general statements in their accounts of Roman elementary education. Secondly, the source material, although it has rarely been adequately exploited, is still very far from satisfactory. As has been well pointed out before in this journal,[2] it is just the simple everyday things about which it is hardest to find information. Thus in the field of mathematics, the important mathematicians concentrated on what seemed to them important topics; and so for knowledge of the fundamental operations—addition, subtraction, multiplication, division—we have to make use of late commentators and text book writers and of widely-scattered incidental references in classical literature.

Yet despite these difficulties the question is one to which an answer ought to be available, and not merely because it is one that troublesome schoolboys insist on asking. Practical calculation was a part of the Roman's life from his early youth; and as a result some

knowledge of his methods will contribute not alone to our understanding of his daily life, but also to our appreciation of his literature.[3]

This calculation of the Roman with, or perhaps despite, his numerals might as a matter of fact proceed in more than one way. In the first place, although inferior in this respect to our so-called Arabic numerals, the Roman's system of notation was somewhat more adaptable to use in written calculation than is generally assumed. He would, however, place greater reliance on two aids to reckoning, his hands, and the abacus or counting board. It is in a consideration of these three possible methods that the answer to our question is to be found. In the discussion which follows, in spite of the fact that among the Romans the ability to handle duodecimal fractions was necessary for those with even an elementary training in mathematics, problems involving fractions have been omitted from consideration. This has been done in the interests of simplicity, and the reader should be quite content to have it so.[4]

Mathematical Tables

BEFORE WE PROCEED to the examination of these alternative methods, it may be wise to point out that they do not in themselves tell the whole story, that all but the most primitive or completely mechanized forms of calculation depend only secondarily on such aids as these, primarily on tables of numerical relations which have been committed to memory and made almost second nature by constant drill. Such drill in practical mathematics was, according to Horace, especially characteristic of the Roman system of education. The poet favors us with a brief glimpse into a schoolroom where the subject of the drill is, as it happens, not whole numbers, but the duodecimal fractions mentioned just above:

> Let Albinus' son tell us: "If one-twelfth (*uncia*) is taken from five-twelfths (*quincunx*), what is left?"
> You could have said, "One-third (*triens*)."
> "Good, you will be able to preserve your estate; add a twelfth; what have you?"
> "One-half (*semis*)."[5]

But for a more complete picture of Roman mathematical tables it is necessary to turn to the fifth century and a treatise by a Christian writer, Victorius of Aquitania (*fl.* 457 A.D.), whose *Calculus* contains very extensive and detailed tables which demonstrate not merely multiplication, addition, subtraction, but also the squares of whole numbers and mixed numbers and the relations of the duodecimal fractions and their subdivisions.[6] This set of tables was presumably for consultation and therefore vastly more complicated than any but the most skilled calculators would be expected to master. Even so there is no reason that we should not assume for the educated Roman a knowledge, on more modest scale, of similar tables to assist him, whether his calculation was written or with the aid of his fingers or that of the abacus.

Written Calculation

ALTHOUGH, as remarked above, calculation using the Roman numerals themselves is more practical than at first appears, their advantages are chiefly for recording: they are convenient; for large sums they are compact; they are rarely illegible; unlike the Latin sentence, they require less suspension of judgment on the part of the reader than does the current system. The simplicity of form of the individual symbols, incidentally, has insured their popularity through the centuries for use on monuments.

But for use in computation, they are inferior to the Arabic numerals. The great superiority of the latter is due to the fact that, thanks to the use of the zero to indicate a blank space, each numeral obtains a part of its value from its position. Thus the value of the symbol 9 is 9 or 90 or 900 depending on whether or not it is followed by one or more spaces indicated by zeros or other numerals. This is admittedly an elementary observation, but like many other fundamental principles is so deeply embedded in our consciousness that for many of us its application has become automatic. This particular advantage the Arabic numerals share with the abacus; which is in fact sometimes used in schools in this country as a visual aid in the teaching of

arithmetic to illustrate the principle of value by position.[7]

Even so, three at least of the operations could be performed without great difficulty, particularly if a little care were employed in grouping the numerals. Addition and subtraction would in fact be slightly easier than with Arabic numerals if corresponding symbols were placed together. In subtracting, for example, 126 from 378 the elimination of the symbols occurring in both numbers provides the answer.

CCC	LXX	VIII
C	XX	VI
CC	L	II

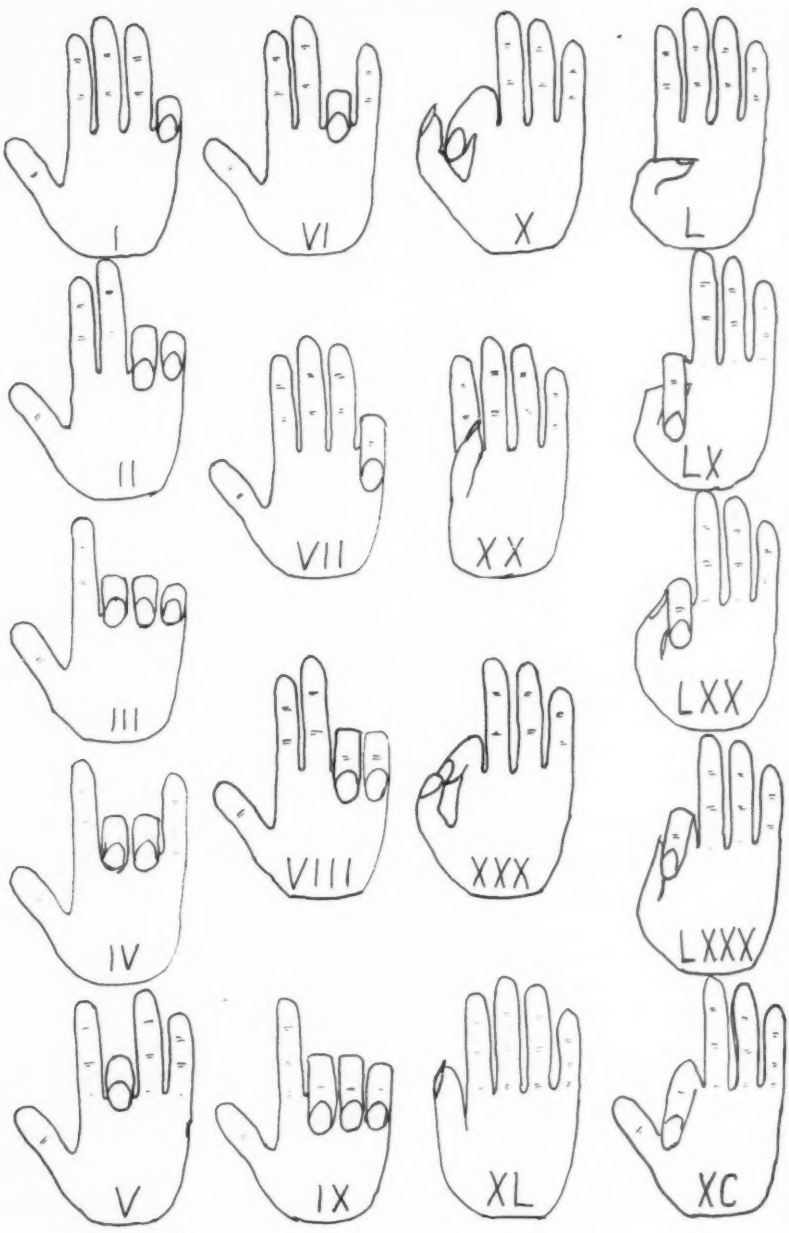
With Arabic numerals, on the other hand, knowledge of subtraction tables would be necessary for performing the operation. There is no reason again why a multiplication problem could not be carried out with Roman numerals in essentially the same way as with the symbols now in use. The reader can easily verify this either by doing a problem himself or by referring to the example given in Smith's *History of Mathematics*.[8] He should remember in connection with this that, as is pointed out in Heath's *History of Greek Mathematics*, it is not the numerals we multiply, but the numbers they represent.[9]

Finger Notation—Sources of Information

THE FIRST of the alternatives to written calculation mentioned above is mental arithmetic aided by flexing of the fingers. Digital notation was especially prevalent in the Middle Ages, and it is from this period that our most complete descriptions come, but there is enough evidence, dating back as far as we may reasonably expect, to indicate a continuous tradition and to show that all, or almost all, Romans used and understood it.[10] Plautus refers to one of his characters as doing sums with the fingers of his right hand, while the elder Pliny tells that a statue of Janus, sufficiently antique in his time that he ascribed its erection to King Numa, had its hands in the proper position to represent 365. Cicero, writing to Atticus, expected the latter to work out with the help of his fingers, as he read, a problem involving the difference between 12% compounded annually and 12% simple interest. Quintilian regarded the knowledge of the correct positions as essential for all persons with claims to literacy.[11] And, in addition, a considerable number of other ancient authors, both pagan and Christian, show a personal acquaintance with finger counting and, what is even more significant, assume the same of their readers.[12]

For the precise nature of this method of expressing numbers we have to depend primarily, though not entirely, on evidence from the early Middle Ages. Its apparent universality is possibly the reason why the earliest written instructions which have come down to us, the *Romana Computatio*, are as late as the seventh century of our era.[13] The *Romana Computatio* is a short pamphlet whose chief importance is that it served as the source for a better known, and considerably more literate, description by the Venerable Bede (673–735 A.D.) which forms part of the first chapter of his *De Temporum Ratione* (725 A.D.). Both the complete work and the single chapter published separately, frequently accompanied by picturesque illustrative diagrams, were very widely distributed in the early Middle Ages, as is shown by the large number of surviving manuscripts.[14] For most numbers these versions agree with a second mediaeval tradition represented by a late Greek writer on elementary mathematics, Nicolaus Rhabdas of Smyrna (*fl.* 1340 A.D.),[15] and by this fact the probability is increased that they both are close to methods used in ancient times.

This assumption of unbroken tradition has more than probability to support it: there are two sources of information from Roman times which, though incomplete in themselves, permit us some confidence that through Bede, with one or two emendations, we can picture Atticus' fingers at work, or the god Janus as seen by Pliny. The first is a series of incidental references to actual finger positions in Quintilian, Apuleius, Macrobius and others; the second, a group of at least twelve small carved bone discs or *tesserae* of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uncertain purpose, probably to be dated in the first three centuries of our era. Each of these bears on its reverse a Roman numeral, on its obverse a hand in the appropriate position.[16] The numbers represented on the published discs are 1, 2 (twice), 4, 5, 6, 8, 9, 12 (twice), 13, 15. Except for the positions for the numbers 10 and 30, this information corresponds very closely with the instructions given by Bede.

Finger Notation—The Positions

As stated above, the numerical values were expressed by positions of the fingers. The digits 1–9 were represented by the use of the last three fingers of the left hand, 10 to 90 with the thumb and index finger of the same hand; for 100 to 900 the thumb and index of the right hand were used, in positions corresponding to those for the tens, and for 1000 to 9000 the remaining fingers of the same hand. By combining these gestures the two hands could represent any number up to 9999.

The evidence seems to be against the assumption that the ancient Greeks and Romans had a system of representing higher numbers by placing the hands with palm or back exposed against various parts of the body as described by Bede. There seems to be no ancient evidence of this and two of the manuscripts of *Romana Computatio* offer quite different instructions for 10,000 and above, although up to this point all agree with one another and with Bede. Furthermore Nicolaus offers no instructions beyond 9999. The ancient Persians are reported to have represented 10,000 in the same way as unity.[17]

What follows is a version of the pertinent passage from Bede with remarks containing information from earlier sources. These should be read in conjunction with the plate and with appropriate gestures on the part of the reader. I treat the subject in rather disproportionate detail because this is the first time so far as I know that all the evidence mentioned below has been used in conjunction, and because I believe that this knowledge could prove very useful to many of the readers of this journal.

"When therefore you say 1, bending the smallest finger on the left hand, you will place it on the middle joint of the palm." This should be compared with the instructions for 7. The representation of these numbers, as of 2 compared with 8, 3 with 9, is not consistent in illustrations found in the manuscripts or on the tesserae. The general distinction, however, seems to be that the fingers were bent over less far for the small numbers, to their own base or over to the place where the palm folds, farther for the higher numbers, towards the hollow of the palm (Nicolaus) or beyond towards its base.

"When you say 2, you will bend the finger next the smallest (*secundum a minimo*) and place it in the same spot.

"When you say 3 you will bend down the third (i.e. middle finger) likewise.

"When you say 4, then you will raise the smallest finger.

"When you say 5, you will straighten the finger next the smallest similarly.

"When you say 6, you will raise the third likewise, keeping only (*dumtaxat*) the middle finger, which is called *medicus* (i.e. the ring finger), fixed in the middle of the palm." This is corroborated by Macrobius when he discusses the reason current in Egypt why this finger, the *digitus medicus* or *medicalis*, is used as the ring finger. After asserting its direct connection with the heart he cites the fact that when bent it expresses the number 6 *qui est omnifariam plenus, perfectus atque divinus*.[18]

"When you say 7, you will place the smallest only above the root of the palm, keeping the rest raised as you do so (*interim*)." See the comment on the instructions for representing 1.

"Next to this, when you say 8, put the *medicus*.

"When you say 9, you will lower the *impudicus* (i.e. the middle finger) from its position.

"When you say 10, you will put the nail of the index on the middle joint of the thumb." This does not correspond exactly with earlier evidence. I discuss this at the end of the translation.

"When you say 20, you will place the tip of the thumb between the middle joints of

the index and *impudicus*." That is to say, the thumb is placed against the palm of the hand in such a way that its tip comes between the index and the finger next to it. According to Nicolaus the four fingers are straight, but bent slightly at the base towards the palm. This would make it possible for the tip of the thumb to reach the middle joints of the two adjoining fingers.

"When you say 30, you will join the nails of the index and thumb in a gentle embrace." St. Jerome, in a comment on the parable of the Sower which was quoted by Bede in the introduction to this passage, speaks of 30 as the number related to marriages because of the union of the fingers *quasi molli se complexans osculo*.[19] As in the case of 10, there is conflicting earlier evidence which I discuss at the conclusion of the translation.

"When you say 40, you will place the inner part of the thumb close to the side or back of the index finger, keeping both erect." Apuleius remarks that 40 is easier than the other numbers because it is indicated with the palm extended (*palma porrecta*).[20]

"When you say 50, you will hold the thumb against the palm with its outer joint bent like the Greek letter gamma." That is, the thumb, bent at right angles like capital gamma (Γ), will be placed against the fleshy "hill" at the base of the index. According to Quintilian previous writers on oratory warned against the inadvertent use of the gesture for 500, made *flexo pollice*, as being inelegant.[21] This gesture differs from that for 50 only in that it is made with the right hand rather than the left.

"When you say 60, with the thumb curved as above, you will encircle it carefully by bending the index finger forward." Jerome, continuing the number symbolism mentioned above in connection with the number 30, says that 60 is used in reference to widows *quod in angustia et tribulatione sint positae*—in the same way that the thumb is pressed down by the index finger.[19]

"When you say 70, with the index bent around as above, you will cover the cavity (*superimplebis*) by applying the thumb; the thumbnail will be upright across the middle joint of the index." Thus the thumb will not be under the index as for 60, but bent (*artu curvato, Romana Computatio*) and placed against the joint of the index at the side.

"When you say 80, with the index bent around as above, you will fill the space under with the outstretched thumb; its nail will be fixed in the middle joint of the index." Thus the thumb is held up straight and the index wrapped around its end.[22]

"When you say 90, you will fix the nail of the bent index against the base of the erect thumb.

"Up to this point ⟨the numbers are represented⟩ on the left hand, but ⟨you will represent⟩ 100 on the right, as 10 on the left." This shift to the right hand for 100 is well attested. Probably the earliest reference is a well known passage where Juvenal comments on the supposed good fortune of Nestor in being able at last to count his years with his right hand.[23]

"⟨You will indicate⟩ 200 on the right as 20 on the left;

"300 on the right as 30 on the left;

"and the rest too in the same manner up to 900.

"Likewise ⟨you will represent⟩ 1000 on the right as 1 on the left,

"2000 on the right as 2 on the left,

"3000 on the right as 3 on the left, and the rest up to 9000."

At this point we shall leave Bede for the reasons stated at the beginning of this section and consider some earlier evidence which shows that despite the general continuity of tradition, a change had taken place in the way 10 and 30 were represented.

In a passage of his *Apology* which is usually described as obscure, Apuleius defends himself against the charge of marrying a woman aged 60. After proving that his wife, Pudentilla, is actually little more than 40 he goes on to comment on the improbability of a genuine error involving 40 and 60. Such similarly formed numbers as 30 and 10 would admit of such an error, but not 40 and 60 since 40 is so simple to form. "If you had said 30 years instead of 10, you might appear to have erred in the gestures involved in

your computation—to have opened the fingers which you should have circled."[24] The assumption that this must be made to conform to the instructions of Bede has led to unnecessary emendation. Although Bede tells us that 30 is formed by placing the tip of the index against that of the thumb, 10 by placing it against the thumb's joint, it is clear from the tesserae for 12, 13, and 15 that in the early centuries of our era the method of forming 10 was by means of a circle formed by joining the tips of the index and thumb. Apuleius' statement agrees with this in making 10 a closed circle, 30, apparently, an open circle. Unless the kisses of the married in the time of St. Jerome were notably lacking in intimacy the circle for 30 had closed by his date, and the tips of the fingers had gently come together.[19] Possibly Jerome made a less clear distinction between the two numbers than did Bede, since he speaks of 100, the right hand gesture corresponding to 10, as symbolizing the *corona virginitatis*.

These differences are, however, minor, no more than should be expected, since over half a millennium separates Apuleius from Bede. The principles of Bede's system clearly date back at least to the first centuries of the Christian era, and we can be confident that in general his system goes back to quite early times.

Finger Computation

THESE GESTURES were widely used for simple computation, as, for example, in a monument from Aesernia of L. Calidius Eroticus and Fannia Voluptas on which is a crude illustration of a traveller and an innkeeper (*caupo*) with hands extended reckoning the former's bill, accompanied by appropriate text which (with the omission of the epitaph proper) reads:

Copo, computemus.
Habes vini ⊃ (sextarium) I, pane a(ssem) I, pulmentar(ium) [i.e. *food other than bread*] a(sses) II.
Convenit.
Puell(am) a(sses) VIII.
Et hoc convenit.
Faenum mulo a(sses) II.
Iste mulus me ad factum dabit [*That mule will be the ruin of me*].[25]

In a situation like this the fingers would register the successive sums in a series of additions, both helping in the calculation and preventing misunderstanding. *Computare* seems to have been the usual word for such reckoning as *calculos ponere* or some similar expression for the use of the abacus.[26]

More complex problems also were worked with the help of the fingers by skilled reckoners like Atticus or Regulus, the villain of so many of the younger Pliny's letters, problems of finance as in the instance mentioned earlier,[27] or of astrology as in the celebrated incident where Regulus gained himself a legacy by working out a sick woman's horoscope and assuring her in the name of the stars that she would recover. The will changed, it was his good fortune to be speedily proved in error.[28] The great advantages of finger reckoning were that the hands were always available whereas writing equipment or an abacus might not be, that all interested parties could observe and follow the stages of the computation. For the Middle Ages a third advantage should be noted: that at the mediaeval fairs all the traders, whatever their native tongue, understood the gestures.

The Abacus

THE OTHER METHOD of working mathematical problems available to the ancient Roman would be the use of the counting board or abacus.[29] That this was the standard instrument for any type of complex calculation is, I believe, a safe assumption, but an assumption based on surprisingly little direct evidence. The very word "abacus" which I have been using does not seem to have been found in this sense in classical Latin literature.[30] The most common terms used are rather *calculi* (pebbles) for counters, *tabula* for the table; *calculos ponere* for undertaking a problem. The widespread metaphorical use of *calculus*[31] is ample evidence of the universal and early use of the device, but precise evidence on its nature or on the way it was used is remarkably scarce.

The terms just mentioned seem to refer to an abacus which resembled mediaeval counting boards in that it consisted of a flat surface

probably marked with lines on which *calculi* were placed in appropriate positions and in appropriate number to indicate the sum desired. These lines would be vertical in relation to the user and, if fractions are omitted, would have a value from right to left of 1, 10, 100 and so on as high as the maker desired. These values would be those which single counters would possess when placed on the lines. The lines might each be divided into a lower and an upper portion. In this case the value of a *calculus* on the upper portion would be five times that of one on the lower. A schematic rendering of such an abacus bearing the number 94826 would be as follows.

(((I)))	((I))	(I)	C	X	I
	o		o		o
	o	o	o	o	o
	o	o	o	o	
	o	o	o		
	o	o			

As it happens no such abacus from Roman times is known to have survived, and if any counters exist, they have not been identified.[32] There is a well preserved Greek line abacus from Salamis nearly $5\frac{1}{2}$ by $2\frac{1}{2}$ feet in size with spaces for representing several separate numbers.[33]

The type of Roman abacus which has survived is a small portable instrument with movable beads which could be slid up and down slots. This type, which has some resemblance to the Chinese *suan-pan* or Japanese *soroban*, is nowhere mentioned in Latin literature. The two surviving examples, in Rome and Paris, are both about 5 by $3\frac{1}{2}$ inches.[33] It is from these that the illustrations in encyclopedias and handbooks are derived. It may be assumed that they are a late development. Unless they are much more convenient than the author's homemade copy, the surviving models are too small to be of much practical use.

The Abacus—The Operations

THE FACT THAT we have little or no direct evidence on the use of the abacus before the mediaeval period is no reason for despairing regarding our ability to describe the operations. The nature of the instrument limits the possibility of any great variety in the performance of the simpler operations, addition and subtraction. Multiplication and division are more complex if not performed by the cumbersome means of multiple addition or subtraction, and there has been enough variety among other known methods to make dogmatism undesirable. In the case of multiplication, however, we have actual examples of how the Greeks worked specific problems with their alphabetical numerals. For reasons I state below, I have assumed their procedure to be the ancient method for abacus as well, and use as illustration an actual problem of Archimedes as worked out by a commentator.

Before I proceed, I should like to remind those who approach this subject as amateurs that the abacus in the hands of an expert is an instrument of remarkable efficiency. This point is well illustrated by a relatively recent incident. In the November 25, 1946 issue of *Time* there was reported the result of a public contest between a skilled Japanese abacus operator using a *soroban*, an instrument possibly descended from the Roman abacus, and an American private using an electrically operated calculating machine. Of the four divisions to the contest, the abacus won the addition, subtraction and division, losing only the multiplication.

I give below examples of addition, multiplication, division illustrating each step. Readers will follow these most satisfactorily if they will make themselves a simple line abacus by means of a few coins and a sheet of paper marked with units, tens, hundreds, thousands, and after performing the sample operations attempt similar problems of their own manufacture.

Addition and Subtraction

The problem:

$$\begin{array}{r} 4739 \\ 1456 \\ \hline 6195 \end{array}$$

At the beginning of the operation the abacus will bear 4739 and have this appearance:

1.

	o		o
(I)	C	X	I
o	o	o	o
o	o	o	o
o		o	o
o			o

The operation will proceed from right to left, from digits to fives and fives to tens. The stages of the operation would have this appearance.

2. Add 6 to the units column.

	o		o
(I)	C	X	I
o	o	o	
o	o	o	
o		o	
o		o	

3. Add 5 to the tens column.

	o	o	o
(I)	C	X	I
o	o	o	
o	o	o	
o		o	
o		o	

4. Add 4 to the hundreds column.

o		o	o
(I)	C	X	I
	o	o	
		o	
		o	
		o	

5. Add 1 to the thousands column.

o		o	o
(I)	C	X	I
o	o	o	
		o	
		o	
		o	

The result reads 6195.

Subtraction would be the same process in reverse.

Multiplication

The opinion that in Roman times multiplication was merely a process of multiple addition may be dismissed. The word *multiplicare* (fold many times) indicates that originally it was such a process; later perhaps shortcuts were introduced, for example, doubling combined with addition until the desired result was reached; but by the time of Archimedes (287–212 B.C.) and of Hero (date uncertain) the Greeks had evolved a method of written multiplication not unlike ours, except that the operation began with the highest power of 10 instead of with the digits; that is, it proceeded left to right instead of right to left. This, incidentally, has been standard practice in abacus reckoning from the time of our earliest recorded instructions. And as will be clear from the example below, the Greek method of multiplication can be adapted so easily to the abacus that it may well have originated in calculation on that instrument. It is rather difficult to believe that the Romans used a more primitive method than was readily available to them.

The primary difficulty in multiplication which starts with the highest power is to find the highest power contained in the product, or, in terms of abacus reckoning, the column in which to place the first counter of the product. There is a rather convenient rule for this, which, as expressed by Alfred Nagl,[34] reads $a+b-1=c$ where a is the number of columns occupied by the multiplicand, b the number occupied by the

multiplier and c the number occupied by the product. This rule was followed by mediaeval abacists and was known to Archimedes.[35] Its practical application is as follows: when 265 is multiplied by itself the number of spaces occupied by the product is $3+3-1=5$. Therefore the first counter is placed in the 10,000 column, the fifth from the right.

This problem, the multiplication of 265 by itself, has been selected because it is one of the problems found worked out in full in Eutocius' commentary on Archimedes.[36] Hero's calculations[37] involved the use of fractions and are too complex for our purposes.[38] Eutocius' calculation, transcribed into the Arabic system, has this appearance.

265
265

40000	12000	1000
12000	3600	300
1000	300	25

70225

The fact that the operation begins with 200 times 200 rather than 5 times 5 is what makes it necessary to write out nine rather than three steps. If performed on the abacus the operation would be simpler since the process of addition would be continuous, not reserved until the end.

1. 40,000(200×200)

((I))	(I)	C	X	I
o				
o				
o				
o				

2. 40,000+12,000(200×60)

((I))	(I)	C	X	I
o				
	o			
	o			

3. 52,000+1,000(200×5)

((I))	(I)	C	X	I
o				
	o			
	o			
	o			

4. 53,000+12,000(60×200)

((I))	(I)	C	X	I
o	o			
o				

5. 65,000+3,600(60×60)

((I))	(I)	C	X	I
o	o	o		
o	o	o		
	o			
	o			

6. 68,600+300(60×5)

((I))	(I)	C	X	I
o	o	o		
o	o	o		
	o	o		
	o	o		
		o		
		o		

7. 68,900+1,000(5×200)

((I))	(I)	C	X	I
o	o	o		
	o	o		
	o	c		
	o	c		

8. 69,900+300(5×60)

((I))	(I)	C	X	I
o		o		
c		o		

9. 70,200+25(5×5)

((I))	(I)	C	X	I
o		o	o	
o		o	o	

The multiplier and multiplicand could be carried in the head or recorded elsewhere, either on paper or wax or on a section of the abacus marked for that purpose, or the multiplier could be placed on the board and the pebbles for 200, 60 and 5 could be removed as their turn to multiply came.

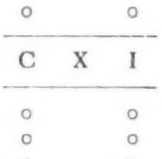
Division

For division it is necessary to resort more to conjecture, since there is no surviving Greek example of simple division, only one involving degrees, minutes and seconds.[38] The following is an example of what is probably the simplest form of division on the abacus. It cannot, of course, be maintained that the Romans divided in exactly this manner, but it shows one way in which the operation could have been performed.[38] Once more the sample operation as performed with Arabic numerals is the same as that on the abacus. The problem is 35 divided into 808. The operation begins with the dividend on the abacus and proceeds by a process of subtraction, the first number subtracted is 350 rather than 35, and the quotient is established as being at least 10. This fact could be remembered, recorded elsewhere—on the abacus or on the fingers of the left hand.

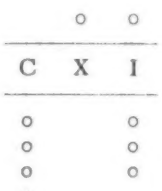
A person with even a small amount of ex-

1. 808
   35
2. 458
   35
3. 108
   35
4. 73
   35
5. 38
   35
6. 3

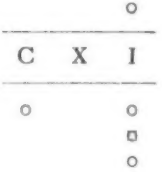
1. The dividend (808)



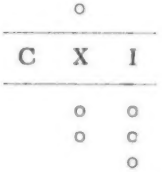
2. quotient is at least 10



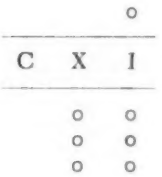
3. quotient is 20



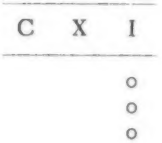
4. quotient is 21



5. quotient is 22



6. quotient is 23, remainder left on abacus



perience could shorten this process considerably by guessing the highest multiple of 35 which is smaller than 80 and the highest which is smaller than 108, as is required in our so-called long division.

Arithmetic and Literature

AT THE BEGINNING of this article I suggested that part of the importance of this subject was that elementary calculation as part of the Roman's everyday life had become part of his literature. This statement should not be left unsupported, especially since not all places where a knowledge of finger-reckoning or the abacus brings illumination to a Latin text are as easily recognized as the ones mentioned or discussed above. I shall cite three examples from Catullus; Martial; Symphosius and Alcuin, the full significance of which remained long unrecognized.

Catullus: VIVAMUS ATQUE AMEMUS

The appeal that begins with these words has long been famous as one of the great love poems of all times.[40] But, despite the energy which has been invested so unstintingly in the elucidation of Catullus' verse, it was as recently as 1941 that the form taken by the arithmetic was explained in print, when Professor Levy of Hunter College pointed out that Catullus was thinking in terms of abacus reckoning.[41] After urging Lesbia that they take advantage of the brief time of life allotted them and disregard the *rumores senum severiorum*, Catullus continues:

> Da mi basia mille, deinde centum,
> Dein mille altera, dein secunda centum,
> Deinde usque altera mille, deinde centum.
> Dein, cum milia multa fecerimus,
> Conturbabimus illa, ne sciamus,
> Aut ne quis malus invidere possit,
> Cum tantum sciat esse basiorum.

There should be no need of having to show in detail that Catullus is here setting imaginary counters on thousand and hundred columns of an imaginary abacus. In the arithmetic of love what elsewhere might be a handicap is a distinct advantage: a vigorous shake of the board and the counters are scattered, the record irretrievably lost, beyond the recall of those persons who wish the lovers ill.

Martial 6, 70

This epigram is on the occasion of the 62nd birthday of one Cotta whose health has been so perfect that he can afford to direct towards his doctor acquaintances his middle finger, the *impudicus*.

> Sexagesima, Marciane, messis
> Acta est et, puto, iam secunda Cottae,
> Nec se taedia lectuli calentis
> Expertum meminit die vel uno.
> Ostendit digitum sed inpudicum,
> Alconti Dasioque Symmachoque.

The poem continues to the effect that only the years of good health should count towards the total: *Non est vivere, sed valere vita est.*

Commentaries have faithfully pointed out that the gentlemen mentioned in the last quoted verse are doctors and by means of cross references[42] have given the reader the means of discovering the meaning of the insulting gesture in the preceding line; but apparently no one has thought of looking for anything in the early lines to give special appropriateness to the gesture described. Those who have completed the editing of more than five books of Martial may perhaps be forgiven for feeling that such a gratuitous insult is to be considered its own justification. I believe, however, that the poem is a trifle more clever than appears on the surface.

The reader may already have undertaken to reproduce the 62 of Cotta's age on his hands. If he has, he has bent his thumb and hooked his index finger over it to form 60 and bent the last two fingers of his hand to form 2, leaving one finger extended, the middle one known as the *impudicus*. Thus in passing his 62nd harvest Cotta, merely by showing his age to his medical acquaintances, has indicated his opinion of them and their tribe.

Symphosius and Alcuin: "Seven from eight equals six."

In the 96th position among the riddles of Symphosius is a numerical riddle entitled

(*Continued on Page 106*)

The Delight of Latin

John G. Hawthorne

From the University of Chicago, with its well-known innovations, comes this courageous and cheerful paper. It is a revision of one read at CAMWS, Cleveland 1950; and goes to the heart of the problem. One might substitute beginning Latin for justice in the first page or so of Plato's Republic II, and see into which category it falls.

IN THE *Poetics* Aristotle speaks of two kinds of delight: To be learning is most delightful not only for the lovers of wisdom, but also equally so for the rest of the world, even if they share in it only to a small extent. For they take pleasure in seeing representations, because as they observe they learn and calculate what each thing is; for example, that 'This is he'."[1] This kind of delight may perhaps be called intellectual pleasure. Then Aristotle goes on to the second kind: "If one happens not to have seen the original, the artist will produce the delight, not as a pleasure due to imitation, but rather as one derived from the execution, the colouring or some other such cause."[2] This kind of delight may be called aesthetic pleasure. This paper is intended to consider these two kinds of delight in relation to Latin. An autobiographical sentence of Gibbon inevitably comes to mind:

> It was at Rome on the 15th of October, 1764, as I sat musing amid the ruins of the Capitol, while the barefooted friars were singing vespers in the Temple of Jupiter, that the idea of writing the decline and fall of the City first started to my mind. After Rome has kindled and satisfied the enthusiasm of the Classic pilgrim, his curiosity for all meaner objects insensibly subsides.[3]

Now the kinds of *intellectual* pleasure that the classic pilgrim may derive from Latin are well-known and few words are needed to call them to memory. The development of an uncivilized and ignorant village into a cultured republic and its transition into a world-empire whose gradual decline ushered in the Middle Ages and our own civilization afford a series of truly great intellectual adventures in almost all phases of human endeavor. The very study of Roman history and politics, religion and science, philosophy and daily life is exciting and its interest is enhanced, not weakened, by the fact that, just as we can watch the beginnings and follow the development, so we can observe the conclusion and collapse. That such a study holds more or less practical lessons for all people goes without saying; but in a more objective way the Roman civilization stands, so to speak, on its own feet as an attraction to intellectual curiosity, offering rich rewards to anyone who is at all concerned with human capabilities. The *aesthetic* pleasure that is to be found in Latin is perhaps more limited. Usually it is derived from Latin verse, that almost untranslatable medium of expression—the cadences of Vergil, the happy phrase of Horace, the bite of Juvenal and the wit of Martial immediately rise to mind. Frequently, too, it is to be found in the grandeur of prose—the gloomy power of Tacitus, the vivid color of Livy and the strong, though sometimes dull, period of Cicero. More commonly neglected are the Roman achievements in architecture, sculpture, painting, mosaic and even silverware. The Romans filled the corners of their empire with such monuments and *objets d'art* and it is only unfortunate that the very profusion of them led to the inclusion of numerous bad, if not vulgar, examples, the effect of which has been a tendency to disparage Roman art in favor of that of other civilizations like the Greek. But a discriminating critic can find much in Roman art that is aesthetically pleasing.

Short though this introduction is, it serves,

I hope, to indicate the wide range of possibilities for enjoyment in the study of Latin and the Latins. But when we turn from the possibilities of such a study to the practice and results of it, a rude surprise awaits us. It has been until recently a universal custom that the American should have at least two years of formal study of Latin. Yet my elders, many of my contemporaries and the majority of college students continually regard this part of their education as dull, meaningless and actually wasteful. The number of Latin majors in the universities is pitiful, the number of freshmen who take a course in Latin after high school is small and the abandonment of any instruction in Latin at all by schools, colleges and whole states is increasing. It may of course be argued that the study of Latin is not a fit subject for universal education, that it is a technical and highly specialized pursuit and that the claims of universal education in this direction can be satisfied by the sketchy glimpses obtained through the now popular general courses in translation in the humanities. Yet the humanities and ultimately general education itself rest on the solid rock of Greco-Roman culture and no intelligent man denies this. It is not the value of the classics themselves that is at issue; if anything, their standing, largely due to the spread of general education, is higher that it has been for several decades. As a small indication of this I find it increasingly common for colleagues of mine who are engaged in the various branches of the humanities to complain that they do not have an adequate knowledge of the classical languages, though unfortunately by the time they become colleagues they are almost always too busy to do anything about it. Again, I do not share the views of that small, vocal and self-critical group which seeks to lay the blame for this situation on the inadequacy of teachers, particularly Latin teachers. The majority of classical teachers is of a higher calibre than is to be found in most other fields. Thirdly, it seems the sheerest snobbery and quite unscientific to pretend that only a small segment of American youth is fit to study the Classics. In any case, as so often in education, it is dangerous to predict which segment or which individual would be fit, until each case is put to the proof. Therefore, if not the subject-matter nor the teacher nor the student is unworthy, we must look elsewhere.

It has become something of an axiom in recent educational theory, particularly at the pre-college level, that the student should take a delight in his studies. In its extreme form this axiom has led to the progressive, undisciplined, self-expressionistic type of casual education that allows the student, however young, to do almost exactly as he pleases. With such an extreme I am not concerned; but the sensible application of the general principle deserves the sympathy and serious consideration of every classical teacher. For, as I have already suggested, there are few mental adventures that afford as much aesthetic and intellectual delight as the study of Rome. Since the classical teacher is in this strong and fortunate position, his problem becomes one of connecting the delight of the subject with the student's capacity for delight. At this point another educational maxim should enter; it is not enough to have a good subject and to consult the interest of the student; the third factor is the teacher; his or her interests should also be consulted, for however good a teacher may be in the abstract, he cannot be practically good unless he is allowed to be delighted with his subject and shows it. In the case of Latin this is often possible, but too often impossible, particularly, I would venture, in schools. The dictator who imposed the Latin curriculum in high schools no doubt had good and theoretical reasons in his day. They are not good today and theory has changed. If one takes the curriculum of the first two years only, years which are without doubt the most important, it cannot be denied that there is a certain delight to be found in Latin grammar and Julius Caesar, but it is a specialized and advanced delight and in no way universal. Anyone who is engaged in teaching these two subjects for several years and can keep his pleasure alive must be either a genius or a bore. Moreover, while Latin grammar and Julius Caesar are undoubtedly Latin, they

form a very small part of the Latin language and civilization and present only a meagre and distorted picture. It is as if one were to suggest that German culture consists of German grammar and selections from Hitler's *Mein Kampf*. I shall not labor the point. A course of two years of Latin grammar and Julius Caesar misrepresents Latin, stifles a teacher's enthusiasm and is practically certain to bore an intelligent student.

In the colleges and in many schools more freedom is allowed and is practiced, even in first and second year courses. The ideal, I suggest, is that the teacher be allowed to teach those passages of Latin literature in which he finds most pleasure and to lecture on or discuss those aspects of Roman civilization which are to him most interesting. There are certain objections to this: first, as regards subject and teacher, uniformity is lost; secondly, as regards the student, it may be asked how can he read good and varied Latin literature without a long training in grammar and ought he to hear about Roman civilization before he can read its literature fluently. This last question answers itself because it is absurd. The only valid reason for studying Latin is to understand its civilization better than can be done by reading about it in English. Therefore while the student is learning to read the language, the more he can learn about its civilization the better. The former question is more difficult and demands more thought and experiment than it receives. Obviously a knowledge of Latin grammar for its own sake is the achievement of a pedant. There are many good reasons for learning Latin grammar: in order to read or write Latin, to help to read or write English, to help to understand language as such and so on. We are chiefly interested here in the first reason and so it follows that grammar is the means and reading is the end. Accordingly it seems proper that reading should appear in the very first week of the curriculum and in every week thereafter and grammar should accompany the reading as a handmaiden rather than head a procession that only too often turns out to consist of little more than the head. After all, the first question that is usually asked of a Latin student entering college is "How much Latin have you read?" and not "How much grammar do you know?" This problem of how to teach a student to read Latin without first forcing him into a year or more of studying only grammar is one that demands continuous study and experiment and great services can still be done the cause of Latin if those teachers who are already experimenting along these lines would compare, discuss and publicize more frequently the methods and results of their experiments.

The second objection to this proposal is that if the teacher is left free to indulge his own pleasures, uniformity of teaching and curriculum is lost. The question here is whether this uniformity amounts to very much in comparison to the sacrifices necessary to achieve it. The ends of instruction are the same; the means need not therefore be straitjacketed. If one teacher prefers to use Catullus, another Livy and a third a varied selection; or if one teacher uses a hard author and reads slowly, while another reads an easy author fast, what is thereby lost? The student reads more and better Latin than at present and is far more likely to be delighted. It may further be thought that with the loss of uniformity goes a loss of discipline. In some subjects this may be true, but assuredly not in Latin. A student who has learnt, parrot-like, to reel off grammatical forms may have an undisciplined mind, but not so one who can correctly translate a passage of good Latin literature.

There is a further point of rather more general significance. Today, as the idea of general education takes over the country, invading universities and colleges and causing new junior and two-year colleges to spring up everywhere, the schools may well begin to wonder what they are supposed to be teaching in addition to the alphabet. For general education, so far as I have seen it, has a tendency to assume that the student is starting from scratch and therefore devotes itself to providing him with a basic all-round acquaintance with the subjects a civilized man should

(*Concluded on Page 98*)

Rhetoric and Latin Word Order

CLASSICAL LATIN, it is generally agreed, is not easy to master. In addition to the difficulties of syntax, inflections and vocabulary, the student also encounters the problem of word order. When wrestling with a long and seemingly involved sentence he may be tempted to conclude that the arrangement of the words is unnatural and wholly without plan, as if the author had tossed a batch of words into the air and then wrote them down in the order in which they landed before him. The student, however, is quite mistaken if he thinks there is no carefully thought-out plan according to which the words follow one after the other from beginning to end of the sentence. But he is right if he believes that the order of words is largely artificial.

The native Latin word and clause order was probably not much different from that of English.[1] But it is in the works of literature, written under the influence of Greek rhetoric, that we find the unusual sequence of words that for a time at least makes classical Latin difficult to read intelligently. The Latin writers and orators were fully aware that they were taking liberties with their mother tongue, and the rhetoricians found it necessary also to defend the practice. Quintilian, for example, says: "I am well aware that there are certain writers who would absolutely bar all study of artistic structure and contend that language as it chances to present itself in the rough is more natural and even more manly."[2] He goes on then to defend the whole system of rhetoric which the Romans had taken from the Greeks.

It is the purpose of these few pages to point out some of the principles that went into the writing of rhetorical Latin and which so definitely affected the word order. We will not, of course, touch upon the whole question of word order, but only upon a few of those characteristics which flow from the basic structure of the artistic prose sentence.

The governing unit of rhetorical prose is the period. The period is made up of smaller units, each of which was called by the Greeks *colon* and by the Romans a *membrum*.

In its earlier days Greek prose style was formless and resembled the spoken word. But in the fifth century B.C., the Sophists decided to apply to prose composition some of the principles which had long been in use in poetry.[3] This shaping and molding of prose style was largely the work of the sophist-rhetorician Gorgias and his pupil the orator Isocrates. In their artistic prose, the colon was to serve in prose the same purpose that verses serve in poetry. The Greek rhetorician Demetrius begins his work *On Style* with these words: "As poetry is divided by measures such as the hemistich, the hexameter and the like, so also is prose style divided by what are called cola."[4] Cicero in his rhetorical works sometimes refers to the members of a sentence as verses, using the word indiscriminately of prose and poetry.[5]

Since the colon was modeled after the verse in poetry, it had, like the verse, in some way to possess a completeness of thought and a unity of rhythm. This completeness of thought is not to be understood in a grammatical sense, but in the same rather undefinable way in which we feel that a line of poetry is complete, though it contains neither a subject nor a predicate. Thus Demetrius goes on to say: "Accordingly, as I maintain, a colon must in all cases be understood to comprise a thought, either complete, or a part of the whole complete in itself."[6] And Quintilian conveys about the same idea when he says: "A colon, on the other hand, is the expression of a thought which is rhythmically complete, but is meaningless if detached from the whole body of the sentence."[7]

As to the length of the colon, it varies, just as it varies in poetry, according to the requirements of the subject matter and the whim of the speaker. But the ideal colon was one that approximated in length and in structure the dactylic hexameter.[8] Like the hexameter it would normally be constructed in two parts, which when properly phrased

would create a caesura somewhere towards the middle. Sometimes the caesura would be vague, and in shorter cola would be missing altogether, just as one does not find it in the shorter verses of poetry.

In reading a Latin sentence the reader will pause slightly at the end of each colon; this pause will not be complete, but just enough to set the colon off as a unit.[9] Furthermore the reader will let up in his breathing at the caesura sufficiently to outline the proper internal grouping of words within the larger unity of the colon. The emphatic places in any sentence are those that precede or follow a pause. The emphatic places, therefore, in a colon are the ends and the middle, that is, the beginning and the end of each half line or hemistich.

Bearing these few principles in mind let us examine a sample from Cicero's third oration against Catiline.[10]

Quo
etiam maiore sunt *isti'odio* supplicioque digni
qui non solum *vestris'domiciliis* atque tectis
sed etiam *deorum'templis* atque delubris
sunt funestos ac *nefarios'ignes* inferre conati.

Wherefore
those men are worthy of even greater hatred and punishment
who not only upon your homes and dwellings
but also upon the temples and shrines of the gods
have attempted to bring destructive and impious fires.

(The *quo* is merely a transition word and stands apart from the general structure and rhythm of the period, and is technically known as a *comma*. We are not here concerned with it, but will say something about it later. To get the full effect of this period and to appreciate adequately the explanations given below, the reader must be sure to read the sentence in one breath.)

We have here, then, four cola, each of them about the length of a dactylic hexameter, each with a well defined caesura. We notice, furthermore, that the important and emphatic words are all clustered about the caesura in the middle of each line. Thus *isti* in the first colon is important because it names the people under consideration who will be defined and described in the next three cola. Obviously also *odio* is emphatic. If we consider the second and third cola together we see that *vestris* is contrasted with *deorum* in the next colon, and that *domiciliis* is contrasted with *templis* in the third colon. In the fourth colon the over-all rhythm of the sentence requires the caesura after *nefarios;* this slight pause puts a stress both upon the adjective and upon the noun *ignes*. In reading Latin in this way, the sharp separation of the adjective from its noun may seem at first a little strange. But we do this regularly and naturally in poetry when we observe the caesura. In the last colon we should also note the book-end arrangement with *sunt* on one end and *conati* on the other, serving as it were to hold together the words in between.

We have seen from Quintilian and Demetrius that the colon must possess some kind of unity of thought and of rhythm. This unity of thought need not be something intrinsic, but may be something which arises from its relation to the rest of the sentence, and would cease to exist apart from the sentence as a whole. That is the case with the following example from Cicero's *De Senectute*.[11]

Nec vero segetibus solum
et pratis et vineis et arbustis
res rusticae laetae sunt
sed hortis etiam et pomariis.

But not only in wheatfields
and meadows and vineyards and woodlands
is farming a source of joy
but also in gardens and orchards.

The third colon contains both the subject and the verb. The other three cola possess their identity partly from the fact that each has a unified rhythmic pattern and partly because each one constitutes in a general way at least a category of plants and shrubs.

A word should also be said about the smaller division of the sentence called the *comma*. Just as in poetry a verse had to have at least two feet or it would cease to be a verse, so also in prose a colon had to possess a certain length before it would meet the strict requirements of a colon. Demetrius tells us: "A comma is commonly defined as that which is less than a colon."[12] Quintilian says: "A comma, in my opinion, may be defined as the

expression of a thought lacking rhythmical completeness; on the other hand, most writers regard it merely as a portion of the colon."[13] Later writers defined it more exactly as any phrase less than eight syllables.[14] But since the difference was purely a technical one, some writers made no distinction between a colon and a comma. Thus Saint Augustine in his treatise on Latin rhetoric[15] quotes the following sentence from Saint Paul and says that it contains three cola, one of them being *alioquin*.

> Alioquin
> velut insipientem suscipite me
> ut et ego modicum quid glorier.

So much then for the colon. We are now prepared to go on to consider the equally important question of the combination of cola into the larger unit of the period. Aristotle defines a period thus: "By a period I mean a sentence that has a beginning and an end in itself and a magnitude that can be easily grasped."[16] "The definition," says Demetrius,[17] "is good and fitting. For the very use of the word 'period' implies that there has been a beginning at one point and will be an ending at another, and that we are hastening towards a definite goal as runners do when they leave the starting-place." The circular nature of the period is also preserved in the Latin translation, *ambitus* and *circuitus*.[18]

As to the length of the period, it could consist of a single colon, provided that it had the requisite length and was properly rounded at the end.[19] But ordinarily a period would consist of at least two cola.[20] As to the maximum length, there was no absolute rule except the basic one that every period had to be capable of being spoken in one breath.[21] But the prevailing period was the quatrain, *i.e.*, one composed of four cola. The quatrain seems to be a very natural way of expressing thought in all literatures and is the most frequent stanza employed in poetry. And just as the ideal colon was one that approximated the nature of an hexameter, so also, Cicero tells us, the ideal period was one consisting of four cola, each of which was about the length of an hexameter.[22]

It was furthermore of the very essence of the period that it be capable of being spoken in one breath.[23] The period had to be complete in thought and in rhythm, and the two had to coincide. There was, therefore, a unified rhythmic sequence throughout, and once this sequence was begun, it could not be broken until it had reached its natural and as it were predestined conclusion. It was as disgraceful for an orator to run out of breath before he reached the end of the period as for a singer to fail before reaching the end of a cadenza. This meant that a good orator had to have powerful lungs and excellent breath control. It is not surprising that Cicero, even at the height of his career, took frequent exercises to strengthen his lungs.[24]

This question of breathing leads naturally to another point. We have said that the period must express a complete thought and that it must be capable of being spoken in one breath. But we find sentences in Latin literature that no orator could speak in one breath. Where that is the case the sentence will break up into two or more subordinate units, each a period or at least equivalent to a period, that is, each possessing rhetorical completeness, while perhaps remaining grammatically incomplete. In stopping for breath in between these units, the orator will perform a twofold task: he will indicate to the listener that a natural and in a sense complete unit has been given, and at the same time he will indicate by the suspension of his voice that the sentence is still incomplete.

Let us now turn to the exordium of Cicero's third oration against Catiline, where we find a brilliant array of oratorical periods. We should not expect to find everything in Cicero written in this fashion. He himself warns us that to maintain throughout an oration an uninterrupted series of intense and highly rhythmical periods would lead to monotony and would also incline the listener to doubt the sincerity of the speaker.[25] But such sustained oratory was altogether proper in the beginning,[26] where one was constrained to arouse the attention of his audience.

Let us now read the introduction to the Third Catilinarian.

Rem publicam, Quirites, vitamque omnium vestrum,
bona, fortunas, coniuges, liberosque vestros
atque hoc domicilium clarissimi imperi
fortunastissimam pulcherrimamque urbem:

The state, o citizens, and the lives of all of you,
your property, fortunes, wives, and children,
this home of the most illustrious government,
the most fortunate and most magnificent city:

At this point the orator will pause for breath. A definite unit has been given, a whole series of objects in the accusative case. They are merely listed here, and only later will we find out something about them.

The *hodierno die* belongs to the next unit, but does not go intrinsically with the next colon. Thus it occupies a line of its own, being technically a comma. It holds a central position in the sentence, and serves neatly to mark off the two quatrains.

After taking a breath, the orator continues:

hodierno die
deorum immortalium summo erga vos amore,
laboribus, consiliis, periculis meis
e flamma atque ferro ac paene ex faucibus fati ereptam
et vobis conservatam ac restitutam videtis.

on this day
by the unrivaled love of the immortal gods for you,
by my labors, plans, and perils,
rescued from fire and sword and almost from the jaws of fate
you see preserved and restored to you.

After those two long quatrains, the orator uses two short ones, thus allowing himself sufficient opportunity to recover his breath fully. And so he continues:

Et si non minus nobis
iucundi atque illustres sunt
ei dies quibus conservamur
quam illi quibus nascimur:

And if to us no less
pleasant and illustrious
are those days on which we are saved
than those on which we are born:

This quatrain sets forth a suppositional fact, and is rhetorically complete. The orator breathes and then continues with another quatrain which sets forth the reason behind the first one.

quod salutis certa laetitia est,
nascendi incerta condicio;
et quod sine sensu nascimur,
cum voluptate servamur:

because the joy of safety is certain,
the condition of being born is uncertain;
and because we are born without perception,
but are saved with pleasure:

After those two short quatrains, his breath now fully recovered, he is ready to launch forth into a long period which will conclude the sentence. He continues:

profecto
quoniam illum qui hanc urbem condidit
ad deos immortales benevolentia famaque sustulimus,
esse apud vos posterosque vestros in honore dedebit is
qui eandem hanc urbem conditam amplificatamque servavit.

certainly then
since him who founded this city
we have raised to the immortal gods with affection and praise,
among you and your posterity he ought to be held in honor
who saved this same city founded and grown great.

Cicero continues the exordium with another long quatrain which falls nicely into two parts, the first two cola constituting the first part and the last two cola making up the last half.

Nam toti urbi, templis, delubris, tectis ac moenibus
subiectos prope iam ignes circumdatosque restinximus,
idemque gladios in rem publicam destrictos retuddimus
mucronesque eorum a iugulis vestris deiecimus.

For we have extinguished the fires that were set and almost surrounded
the whole city, the temples, shrines, dwellings and walls,
and the swords drawn against the state we have also struck down
and their sharp points we have turned aside from your throats.

The final sentence of the exordium is on a much lower plane emotionally than the others, and also departs from the quatrain form. It falls into two parts, each with three cola, connected by the conjunction **ut**. The natural breathing place is after *Quirites*.

Quae, quoniam in senatu
illustrata, patefacta, comperta sunt per me,
vobis iam exponam breviter, Quirites,
ut
et quanta et quam manifesta
et qua ratione investigata et comprehensa sint
vos qui et ignoratis et exspectatis scire possitis.

Since in the senate these events
were disclosed, made clear, and recounted by me,
I will now briefly lay them before you, o citizens,
that
how great and how manifest they are
and by what means they were sought out and suppressed
you who are uninformed and eager for news may know.

The discussion could be continued at great length and with endless examples, but enough has been said to point out the importance of knowing the basic principles of rhetorical structure in comprehending Latin word order. The matter can be thus briefly summarized: The word and clause order in artistic prose is artificial, since the sentences are shaped to conform with the principles of rhetoric, which in turn had been taken from Greek poetry. The verses of poetry become in prose the cola, and these are combined to form the larger unit of the period. If these few facts are borne in mind, what seems at times to be a hopeless jumble of words is seen to be no jumble at all, but a beautifully constructed piece of art. And once the student has learned to look at a Latin sentence in this fashion, the study of Latin literature becomes more profitable and more pleasant.

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NOTES

[1] Here is a striking example of difference of word order in two different passages from the same author, Saint Ambrose, bishop of Milan (d. 397). The first is quoted from a long prayer which he composed. With the exception of the two italicized pronominal adjectives, it follows the English word order exactly, and can be translated word for word as it stands.

Rex virginum et amator castitatis et integritatis,
caelesti rore benedictionis *tuae*
exstingue in corpore *meo* fomitem ardentis libidinis
ut maneat in me tenor castitatis corporis et animae.

King of virgins and lover of chastity and integrity,
by the heavenly dew of thy blessing
extinguish in my body the tinder of burning passion
that there may remain in me the tenor of chastity of body and soul.

But with the following quotation, from his work *De Viduis*, we are in another world entirely, the world of classical rhetoric. Both the word order and the consequent rhythm of the sentence are totally different.

Nam confectis et miles stipendiis
arma deponit,
et relicto officio quod gerebat
ad propria veteranus rura dimittitur
ut
et ipse exercitae laboribus vitae
requiem consequatur,
et alios spes futurae quietis
subeundis faciat operibus promptiores.

[2] Quintilian, *Institutio Oratoria*, 9, 4, 2.

[3] "The old Greek masters held the view that in this prose style it is proper for us to use something almost amounting to versification . . . These two things, therefore, I mean modulation of the voice and the arrangement of words in periods, they thought proper to transfer from poetry to rhetoric, so far as was compatible with the severe character of oratory." (Cicero, *De Oratore*, 3, 44, 174) The idea can be seen perhaps even more clearly in Demetrius where he says: "The periodic style is found in the rhetorical discourses of Isocrates, Gorgias and Alcimadas, in which the periods succeed one another with no less regularity than the hexameters in the poetry of Homer." (Demetrius, *On Style*, 1, 12) These early masters were especially fond of the figure of speech known as *parisosis*. On this matter Bernhard in his work *Der Stil des Apuleius von Madaura* (p. 87) makes this observation: "The principle of counting syllables played a part in the oldest Greek poetry, to which the Aeolic lyric still bears witness. In poetry this element gradually went out of use, but it reappeared in artistic prose. Gorgias made this rhetorical figure, *parisosis*, a technical principle of prose, and from him it spread to his school."

[4] Demetrius, *On Style*, 1, 1.

[5] Quoting this line, "Cur de perfugis nostris copias comparant contra nos?", Cicero says of it: "It consists of only two verses, that is, *membra*." (Orator 66, 223)

[6] Demetrius, 1, 3.

[7] Quintilian, 9, 4, 123.

[8] "The full comprehensive period consists of approximately four parts which we call *membra* . . . The full period, then, consists of four members, each approximately equal to a hexameter verse." (*Orator*, 61, 221–222)

[9] On the question of pausing and breathing, Quintilian analyzes a sentence from Cicero in the following fashion: "Who, for example, can doubt that there is but one thought in the following passage and that it should be pronounced without a halt for breath?

Animadverti, iudices
omnem accusatoris orationem
in duas divisam esse partes.

Still the groups formed by the first two words, the next three, and again by the next two and three, have each their own special rhythms and cause a slight check in our breathing." (9, 4, 68) The pause, scarcely more than a hesitation, after *duas* will, of course, be much slighter than those at the ends of the lines.

[10] *Oratio in Catilinam Tertiam*, 3, 22.

[11] *De Senectute*, 54.

[12] Demetrius, 1, 9.

[13] Quintilian, 9, 4, 122.

[14] Cf. L. Laurand, *Discours de Ciceron*, II, p. 138.

[15] Saint Augustine, *De Doctrine Christiana*, Book IV.

[16] Aristotle, *Rhetoric*, 3, 9, 3.

[17] Demetrius, 1, 11.

[18] Quintilian tells us in this sentence how the Greek terminology was generally translated into Latin: "The most closely welded style is composed of three elements: the *comma*, or as we dall it *incisum*, the *colon* or in Latin *membrum*, and the *period*, which Roman writers call *ambitus*, *circumductum*, *continuatio*, or *conclusio*." (9, 4, 22) Cicero also uses the term *circuitus*.

[19] Aristotle, *Rhetoric*, 3, 9, 5.

[20] "The smaller periods consist of two members, the largest of four. Anything beyond four would transgress the due bounds of the period." (Demetrius, 1, 16) This statement, however, expresses the *ordinary* situation. From Aristotle and Quintilian we see that there may be periods smaller than two cola and larger than four.

[21] Quintilian has this to say concerning the number of cola in a period: "The average number would appear to be four, but it often contains even more. According to Cicero, its length should be restricted to the equivalent of four *senarii* or to the compass of a single breath." (9, 4, 125) Quintilian here misquotes Cicero slightly, since Cicero speaks not of *senarii* but of *hexameters*. See note 8 above. The results, however, would be about the same, since a senarius and a hexameter are nearly the same length.

[22] Cf. note 8 above.

[23] "It was failure or scantiness of breath that originated periodic structure and pauses between words; but now that this has once been discovered, it is so attractive that, even if a person were endowed with breath that never failed, we should still not wish him to deliver an unbroken flow of words." (*De Oratore*, 3, 46, 181)

[24] Cicero gives an interesting insight into an orator's problems when he puts these words at the beginning of his twenty-third letter to Atticus: "I don't think that you ever before read a letter of mine which I had not written myself. That will show you how I am plagued to death by business. As I haven't a moment to spare, and must take some exercise to refresh my poor voice, I am dictating this as I walk."

[25] "Putting aside other forms of oratory, we have selected for our discussion that used in law-court and public assembly. In the other forms, to be sure, that is in history and epideictic oratory, as it is called, it is desirable to have everything done in the periodical style of Isocrates and Theopompus, so that the language runs on as if enclosed in a circle until it comes to an end with each phrase complete and perfect . . . . But this style of prose is not to be taken over bodily into forensic speeches, nor is it utterly to be rejected. If you use it constantly . . . it takes the feeling out of the delivery . . . and utterly destroys the impression of sincerity." (*Orator*, 61, 207–209)

[26] "The full periodic style is well adapted to the exordium of important cases . . . It is also most effective in the peroration." (Quintilian 9, 4, 128)

LATIN WORD ORDER

(By courtesy of *The Classical Outlook*)

WHICH OF THE FOREIGN languages currently taught in the schools of the United States is the hardest? Vigorous discussions have been raised in my hearing by this question, both among students gathered in the halls and comparing notes on their respective courses, and by friendly groups of teachers chatting over the lunch table. It is not a question that admits of an unequivocal answer, for many factors must be considered. One of them, of course, is the learner's linguistic background: a Chinese boy will find Latin more troublesome than an American will. Again, a language whose vocabulary is relatively familiar to, say, the English-speaking student may offer greater problems in pronunciation, or spelling, or syntax than some other language with a more difficult vocabulary. Then there are students who prefer Latin to the modern tongues because they don't have to speak it; others choose the latter because they are used orally. And so it goes.

What position can be assigned to Latin in such a discussion of the various aspects of languages? Pronunciation and spelling surely offer no trouble to the American child; in this respect Latin is perhaps the simplest of all the languages under consideration here. The vocabulary, too, for an English-speaking class at least, has so many points of resemblance to the vernacular that it should be an aid rather than a hindrance in the learning process. Morphology, to be sure, and syntax are much more complex than in English, but then the same is true of French, German and Spanish. All of these have verbal inflections to a greater degree than does English; all of them make frequent, colloquial use of the subjunctive; all of them have peculiarities of prepositional usage that give pause to an

American class. Thus far, then, we may safely say that Latin holds it own against its fellow languages.

But then comes word order! What a far cry here from even Caesar, the most regular and therefore predictable in this respect of the commonly read Latin authors, to the normal idiom of English, of the Romance languages, yes, of German too, whose verbal arrangements are at least subject to certain rules, which can be learned. The order of the words in a Latin sentence, on the other hand, seems a thing of whimsy. We are told, to be sure, that there is a "normal" order (subject, subject modifiers, verb modifiers, verb); then, perforce, must follow the caution that this "normal" order is far less the regular occurrence in Latin than our normal order in English. (For a good statement on the subject, see Ullman and Henry, *Latin for Americans I*, rev. ed., 100.) And so it is. With the flexibility made possible by the semantic and functional precision the many inflectional endings give the individual unit of speech, each word, in order "to bring out varying shades of emphasis" (Ullman and Henry, *loc. cit.*) may indeed stand in almost any position. The teacher's problem now is a twofold one: first, to teach the student to follow the Latin thought in the Latin order; and second, to justify what is, to the student, a baffling aberration to be condemned in the strongest terms.

An excellent, though brief, example of how a class may be brought to read in the Latin order is given in *Latin for Americans II*, rev. ed., 5–6. Neither Caesar nor Cicero will be really difficult in this respect if only the class has been taught from the beginning to take each word as it comes, instead of playing hopscotch all over each sentence; and if only it has had plentiful experience with "the rich variety of real Latin" (Waldo E. Sweet, "Latin without a Dictionary," *CO* XXVIII, 30). Unfortunately it is only too true that "the word order of many of our texts is too easy, monotonously repeating nominative, accusative, and verb." (Sweet, *loc. cit.*).

It has been my experience that certain fundamental principles, if sufficiently stressed, will clarify this matter of word order and enable the student to make relatively rapid progress in reading Latin as Latin. Perhaps the following hints and "tricks" may be of value to other teachers as well.

In the first place, I never tire of impressing upon a class the absolute necessity of knowing their forms "cold," for it is obvious that in Latin one is lost if one cannot distinguish an accusative from an ablative, a singular from a plural, or a perfect infinitive from a pluperfect subjunctive.

Secondly, I try to simplify and minimize syntax as much as I can. (This is possible, of course, only when the stress in the course lies on reading; for "prose composition" an exact and active knowledge of syntax is essential, but I have no great faith in the value of this kind of exercise—except in limited doses—in the ordinary class room.) In most cases, it is possible to crystallize the function of an item to one or two common usages: let these be enough. Thus it seems of little use to cultivate the ability to distinguish between *cum* manner and *cum* accompaniment, when both are translated by "with." What is important is that *cum* plus ablative is "with," whereas *cum* plus verb is "when." Nor do I think it essential to keep tabs on the four different conjunctional uses of *cum:* temporal, circumstantial, causal, concessive; nine times out of ten it is adequate to say that *cum* plus verb signifies "when." To stop the train of thought in order to decide why subjunctive or indicative is used seems pointless. (As a matter of fact, I tell classes in most cases to ignore the existence of the subjunctive itself: only after *si* and *ut*, and when there is no special introductory word, must they be careful; for only here does the mood have a semantic rather than a purely conventional, grammatical function.) "Since" and "when" being practically interchangeable in modern English, "when" will usually do nicely to render *cum* causal, and as for the few cases of *cum* concessive, they are mostly marked clearly by an accompanying *tamen*, so that even here the subjunctive is not always functional. Again with prepositions:

once the meaning of the preposition is known, the question of case may safely be ignored—as it is in English. Even such bivalent words as *in* and *sub* need be no problem, for usually the verb will make the meaning clear: no one would think of interpreting *regnum in civitate occupavit* as "he seized the power into the state." Besides, most Americans no longer distinguish between "in" and "into"; witness the common "He came in the room."

As with prepositions and conjunctions, so with case endings. These too can be treated almost lexicologically. The genitive is rendered by "of" so often that it is a waste to stumble over partitive, possessive, objective, subjective, etc. The dative is "to" or "for"; if one doesn't sound right, try the other. The accusative by itself is the object—four times out of five—or it looks like the object (*quattuor horas dormivit* is good English: "he slept four hours"). The only catch may be a nearby infinitive—watch out for it! The single ablative may seem a tough nut. But it too can be broken down into means ("by"), separation ("from"), time ("at"); and the accompanying verb or the word in the ablative itself will often give away the answer, for *prohibeo* calls for "from" and *nocte* must be time, while *saxo* is probably means. Be careful, however, of comparatives in the neighborhood, which may require our ablative to be rendered by "than."

One more illustration of this matter of simplifying: the infinitive. The less said of it, the better, for with one exception its usage is English. A class has no trouble with *venire volo, eum venire volo, venire est necesse.* The exception, of course, is indirect statement, and this must be taught early and clearly and thoroughly. Yet here too we have a foothold in English sentences like "I know him to be sick." Still, the application of the principle is difficult and requires a patient teacher.

Thus there is, first, insistence upon recognition of endings and, second, reduction from multiplicity to unity in syntactical usage. Last but not least, reading, not by words, but by groups of words. Here I find our texts woefully lacking in the commas which can be of great help in showing the student where the groups begin and end. And since we add long marks to the printed page from the same motive of furnishing assistance, why not more punctuation marks? In a more graphic way, that is precisely what the filmstrip phrase-by-phrase projection method does (see, e.g., R. H. Walker's "Audio-Visual Latin," *The Classical Outlook* XXV [1947–1948], p. 48).

Analysis of one typical sentence each from Caesar and Cicero may clarify the operation of the method I am advocating. I pick at random—*De Bello Gallico* 1.8: "Interea, ea legione, quam secum habebat, militibusque, qui ex provincia convenerant, a Lacu Lemanno, qui in flumen Rhodanum influit, ad montem Iuram, qui fines Sequanorum ab Helvetiis dividit, milia passuum XVIIII, murum in altitudinem pedum sedecim fossamque perducit." (I have introduced six commas not in the edition I used.)

Interea is vocabulary. *Ea legione:* probably "means"—couldn't be "time"—there's no comparative so far—and "from," while possible, is not likely: a general's means or instruments are his soldiers. The next three words are no problem: "(legion) which"—accusative, hence object—"with himself"—we know we're reading about Caesar—"he had"; "he had with him." *Militibusque: -que* joins equal things—*militibus* is either dative or ablative—there are no datives so far—*legione* was ablative—*militibus* is ablative—"by means of legion and soldiers." The next group is simple—a vocabulary matter. *A Lacu Lemanno: a* could be "by" or "from"—but "by" requires a person in the ablative—hence "from." The next five words are vocabulary, again, as are the next three. *Qui fines Sequanorum ab Helvetiis dividit: qui* being nominative, "the lake which," *fines* must be object—the lake does something to the *fines*—one shift of the eyes shows *dividit* (comma: stop!)—"the lake which divides"—then *a* must be "from." *Milia passuum XVIIII:* "19 miles"—obviously a distance. *Murum—perducit* (one eye-span): the wall is accusative, hence object—"in height of 16 feet" makes sense, though poor English—*fossamque* must be a second object—what

can he (*-t* of *perducit*) have done to a wall and a ditch by means of soldiers? Why, built it! Then one can explain how *ducere* came to mean "build"—the idea of "leading" or "drawing" a gradually lengthening "line" of fortifications, as seen from the neighboring heights. Well, with soldiers, from one point to another, a certain distance, a wall (pretty high) and a trench—that's what Caesar built. The meaning is clear. Translation into good English is another matter—but the student now knows what happened.

Cicero, *In Catilinam* 3.3: "Principio, ut Catilina paucis ante diebus erupit ex urbe, cum sceleris sui socios, huiusce nefarii belli acerrimos duces, Romae reliquisset, semper vigilavi et providi, Quirites, quem ad modum, in tantis et tam absconditis insidiis, salvi esse possemus."

Principio: ablative or dative—but the word is one of time—hence "at the beginning." *Ut:* "as" or "that"? A quick glance ahead (better yet, *erupit* has already been spotted as indicative, the eye-span, guided by the commas, having covered the words from *ut* to *urbe* as one unit) shows *erupit*, indicative—hence "as." *Catilina* (short *-a*): here's our subject. Now what did Catiline do? First, however, we learn when it happened: *paucis ante diebus*.

Here I wish to enter a parenthetical remark. In view of the current dearth of commas, I have found it useful to point out to students that Latin words have a habit of coming in threes, as here and again below, *quem ad modum*, in a way that is unfamiliar to English—a boxed-up order, as it were, with two units of the same type enclosing a unit of a different type. Not too common in Caesar, it increases in frequency in Cicero, and becomes a normal (and puzzling) practice in poetry. Since it occurs most often with prepositions, as in our two instances from Cicero, I call it the *magna cum laude* order, for classes are familiar with the phrase (or should be) and its use adds a potential touch of humor to the proceedings—when a good student fumbles, I will remind him of the *summa cum* order. But the collocation is found in other combinations, too, and the following examples will show how varied are the problems whose solution is eased by this hint: *unius usuram horae* (*In Cat.* 1.29), *omnes honorum gradus* (*ibid.* 1.38), *hoc uti genere* (*Pro Arch.* 3), *celebri quondam urbe* (*ibid.* 4), *Tyrii tenuere coloni* (*Aen.* 1.12), *terris magis omnibus* (*ibid.* 1.15), *haec ubi dicta* (*ibid.* 1.81), *toto proruptus corpore* (*ibid.* 7.459); in the poets this order may grow to considerable proportions, becoming quite involved: *duri magno sed amore dolores* (*Aen.* 5.5), *veris facilis datur exitus umbris* (*ibid.* 6.894), *ille triumphata Capitolia ad alta Corintho / victor* (*ibid.* 6.836–837). Occasionally too the enclosed unit is not a word but a phrase, as in *consilium ad facinus aptum* (*In Cat.* 3.16) and *infusa per artus mens* (*Aen.* 6.726).

But to return to our sentence. *Erupit ex urbe* presents no problem. *Cum sceleris sui socios* (one eye-span) shows that *cum* must be "when." *Sceleris sui socios* gives us "companions of his crime," an accusative—Catiline must have done something to his companions. The next group identifies them, as we see from the second accusative, *acerrimos duces*. The genitive *huiusce . . . belli* fits in nicely with "leaders (of)." With *Romae reliquisset* we both have proof that *cum* is "when" and discover what Catiline did with his "pals"; and since we leave things "at" home, "at" will be our preposition for *Romae*. The rest of the sentence needs no further analysis, the word order being English, save for the last group: "ever I watched and took thought, citizens, how (*quem ad modum* is really a vocabulary item), in such great and so concealed treacheries, we could be safe." Note finally, first, that in this last phrase the subjunctive is immaterial to either understanding or translation—being past, it can safely be rendered by the past of "can"; and, second, that in *salvi esse possemus* we really have a *magna cum laude* phrase, in slightly disguised form: nominative plural referring to the subject—infinitive—plural verb referring to and giving the subject.

Thus far I have tried to show how the teacher's first duty, to teach reading in the Latin order, can be achieved. At the same

time, it has become clear, I think, how the second, the justification of this word order, can be accomplished. In essence, except for the order in small groups (especially the *magna cum* type), the succession of thoughts in a Latin prose sentence is not unlike its English equivalent; only there is a stronger tendency, visible in the habit of postponing the verb, to invoke suspense as to the action accomplished. To call attention to this favoring of the emotional quality of a sentence is highly useful in accounting to a class for what certainly is, from one point of view, an abnormal order: that of poetry. These elements of emotion and suspense, together with what I call impressionistic reproduction, will become clear from a final illustration: my favorite example, wonderful in the way that word order corresponds to occurrence and thought, is from Horace, but the principle applies to all the poets.

In *Carm.* 1.9 Horace has been enumerating the things that make life worth while; with lines 21–22 he reaches the climax: "Nunc et latentis proditor intimo / gratus puellae risus ab angulo . . . ," apparently, from the standpoint of the modern languages—or even that of Latin prose—an impossible arrangement of words.

The poet has just mentioned the *composita hora:* for once, the *puella* has arrived before "the appointed time," and she's going to play the boy-friend a trick. When he gets to the meeting place, no *puella* in sight, but someone is hiding somewhere (first impressions never fail—*latentis*). He knows because something gives the hider away (*proditor*)—what is that noise? It's not very close (*intimo*). But it's a pleasant sound (*gratus*), distinctly female, too (*puellae*). Why, she's laughing at me (*risus*)! Aha, there she is, around the corner (*angulo*)! And then follows the mock struggle of the last two lines of the poem.

Anything but artificial, this word order is powerful as a modern painting, subtle and realistic as a modern poem, made possible, of course, by those hard-to-learn case endings, yet surely abundantly worth the trouble it takes to learn them.

So, even when it comes to word order, Latin need not be the bugaboo that it has been called. Comparatively like English, in the prose authors, with differences that can be explained and accounted for, it can furnish a class with an exciting game, a treasure hunt for emotional, dramatic, esthetic qualities when the poets are reached. I sometimes think that we both overstress the difficulties and underestimate the potentialities of that much maligned matter of Latin word order.

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THE GREEK ANTHOLOGY IN ENGLISH

Robert Vosper

(Read before CAPS, Northern Section, March 27, 1948, at Eugene, Oregon)

I WANT TO TALK with you about the Greek Anthology, not as the Greeks and you would know it in the original language, but as it comes to most modern readers, in translation. To you translation needs no defense; for surely we are above all things humanists, who do not agree with the disdain for literature in translation that is too common in academic circles.

In the 1931 Taylorian Lecture at Oxford, Hilaire Belloc emphasized tne increased social importance of translation in that day of disunion, for said he "it is the condition without which a common culture cannot exist." In the succeeding few years we have become even more acutely conscious of the need for understanding the minds of other men. And in this international understanding, sensitive and intelligent translation is a special factor. UNESCO has taken as one of its particular tasks the promoting of the publishing of translations; and those who would know the technical difficulties of that task should read the words of that enlightened publisher, Sir Stanley Unwin. So much for a subject apologia.

Men of all times and many countries have found in the Anthology something of delight. It has been translated into Icelandic and Hungarian as well as into more common

languages. It would truly be a study in comparative literature to criticize the translations of, say, Maikov and those of Herder. Fortunately mine is a lesser task.

The wide usage of the Anthology by English poets of the 18th and 19th centuries is already known to you, and the influence of the Greek epigrams on Elizabethan lyricists has been analyzed. Consequently I want to limit myself to some more recent versions. I think we can all take heart from the frequency with which literary men of our own day have tried their hand at this particular task; for this directly belies the frequent weeping over the lapse of interest in the classics.

Even in the slight compass that I have set, the continuing and fascinating problems of translating poetry receive a variety of answers; such a variety that it becomes obvious that the answers, like those to so many questions of aesthetics, are largely dependent on individual taste.

Who is to say, for example, that poetry is better translated into prose or into verse? Such a critic as F. O. Matthiessen has said that "translations in verse naturally present a wholly different problem in technique, and are, as a whole, distinctly inferior to those in prose. . . ." His reference here may be only to the Elizabethan period, but he appears to make a generalization.

Interestingly enough, there is fairly common agreement among subsequent translators, even those who themselves dare verse, that the prose version of Mackail is a high-mark. Dudley Fitts calls the *Select Epigrams* a "liber aureus, unsurpassed of its kind." Stephen MacKenna the Irish translator has called Mackail's work "an almost perfect example" of translation. Norman Douglas uses Mackail's form of the sepulchral epigram to the old bee-keeper, because he doubts that can be made to "read better, more stonily. . . ."

> Naiads and chill cattle-pastures, tell to the bees when they come on their springtide way, that old Leucippus perished on a winter's night, setting snares for scampering hares, and no longer is the tending of the hives dear to him; but the pastoral dells mourn sore for him who dwelt with the mountain peak for neighbour.

In modern letters Richard Aldington is pre-eminent for the variety and amount of his excellent translations. Artist as he is in his own language, both in prose and verse, his list of translations into English is startling, including Euripides, Gerard de Nerval, Voltaire, Boccaccio, Goldoni, and many others. I have seen a recent letter from him reporting that he is currently pursuing some seventy translation projects, involving a dozen languages. In consequence the ready confusion of his name with that of the Elizabethan William Adlington is only part of the humor of fate.

It is not surprising that Aldington has translated from the Anthology, for its direct influence on his own creative spirit is obvious. His poems are commonly touched with Greek imagery, even to the extent of a sequence of "Epigrams," such as this called "A Girl"

> You were that clear Sicilian fluting
> that pains our thought even now.
>
> Yours were the notes
> Of cold fantastic grief
> Some few found beautiful.

Aldington's translations from the Anthology appeared in three thin volumes: *Anyte of Tegea*, 1915; *Meleager*, 1919; and *Anacreontea*, 1919. These were all combined into *Medallions*, 1930. His prose is crystalline and spare, well suited to the chiselled, epigrammatic quality of the Greek; yet he manages to transfer the lyrical effect of the poetry through delicacy of phraseology.

> I, Hermes, stand here at the cross-roads by the wind-beaten orchards, near the hoary-grey coast;
> And I keep a resting-place for weary men. And the cool stainless spring gushes out.

He can even recreate the lushness of Meleager, without resorting to poeticisms, through the nice application of assonance and alliteration.

> Now the white violet blooms and the rain-loving narcissus blossoms and the mountain-haunting lilies are flowering; even the sweet amourous rose of Persuasion, flower among flowers, Zenophile, now blooms.
> Meadows! why do you laugh so gaily and so rashly under your tresses? She is lovelier than your sweet-breathing garlands.

Forrest Reid, whose *Poems from the Greek*

Anthology appeared in 1943, is a sensitive reader and critic of lyric verse. Yeats and De La Mare are his special favorites, and his recent *The Milk of Paradise* is a highly personal and delicate essay on the lyrical element in English verse. His translations however are into prose, a particularly direct and unadorned prose, concise and yet liquid.

I, Hermes, stand here at the cross-roads, by the wind-swept orchard near the grey beach, offering rest to tired men.

And the cold pure water gushes out.

Traveller, rest your weary limbs under the elm-tree.
Softly the wind whispers through the green leaves.
Drink a cold drink from the spring.
In burning summer this resting-place is dear to wayfarers.

Here is one of his versions of Meleager:

Noisy field-cricket, drunk with dew, playing your rustic music in this solitude.
Poised on the top of a leaf, with your saw-like legs and sun-burnt skin you shrill out your tune.
Sing, little friend, a new song to the tree-nymphs, cry aloud your cry in answer to Pan.
While I, a fugitive from Eros, sleep my noontide sleep in the shadow of the plane-tree.

Aldington and Reid have succeeded at the remarkably difficult task of putting verse into prose without losing entirely the shock and pleasure of poetry; for surely their versions, without rime or obvious metre, and with slight adornment, "suggest more than the bare words actually say."

The late Sir Shane Leslie's *The Greek Anthology* appeared in 1929, yet he seems much further from the modern spirit than either Aldington or Reid. The purple language of his foreword is a true introduction to his work. "Many a silver pitcher has been lowered by many a purple cord into these gathered fountains of Hellas," says Mr. Leslie with more than Irish oratory, and then proceeds to adorn his prose versions with "ye" and "flowereth" and "melodisest" and all the familiar verbiage of the translator who would lend poetry and an archaic air to his work. For some of the late Greek this may perhaps be excusable, but in general it is suspect.

Against hope thou comest to my yearning. Thou didst surprise and trouble all the phantasy of my soul. I tremble and my heart quivers to the depth under thy spur. My soul is drowning in the Aphrodisian wave. But save me from being shipwrecked so near to land and welcome me in thy harbours.

An even more exotic flavor is the distillation by that mysterious figure known as Baron Corvo. This is typical of the *Songs of Meleager* that he "made into English" in collaboration with Sholto Douglas.

O soul of mine, O love-lost soul, did I not cry to thee as thou wast fluttering over and over the snare, that it would catch thee? Did I not cry to thee? Thou art caught in the trap: thou art bound: thy struggles are fruitless. 'Tis Love, Love who hath bound thy wings, casting thee on to the fire, with spices besprinkling thee breathless . . . .

He who would translate into verse has an even more trying task, for he has an additional element to work into his potion. And moreover, if he fails, the failure is the crueler, for pedestrian verse has little to redeem it. We have a ready measuring rod for translation in verse, although not an easy one to apply. The translator must "translate" to the extent that he reveals the spirit and emotion of the original; if possible he must approximate or imply the form of the original, and yet produce a poem that gives every immediate impression of being an original in itself. Obviously this is a large task, but many a poet has delighted in trying it.

James Elroy Flecker's early years were much given to a wide variety of translation from French, German, Turkish, Latin, and Greek. In this he saw a problem to be attacked and a challenge to his careful craftsmanship. He has even written of himself at work, in "The Translator and the Children."

While I translated Baudelaire
Children were playing out in the air.
Turning to watch, I saw the light
That made their clothes and faces bright.
I heard the tune they meant to sing
As they kept dancing in a ring;
But I could not forget my book,
And thought of men whose faces shook
When babies passed them with a look.

Flecker's "Heliodora (from Meleager)" is a delightful lyric.

Why dost thou touch, O flower-fed bee,
Heliodora's skin,
When open buds are asking thee
To make thy home within?

What parable art murmuring?—
That Eros makes man whole,
And turns the poison of his sting
To sweetness in the soul?

Is this your message, silly bee?
A dreamer takes it so.
Then home again! Don't trouble me!
I knew it long ago.

His translation from Virgil's Book VI has this introductory note that admirably states the position of the poet translating poetry, "I have, of course, tried to translate the sound of the thing, rather than the text. . . ."

The question of form is a vexing one, and particularly for the translator of the Anthology into English; for obviously English prosody has no metrical pattern similar to the highly stylized elegiac couplet yet capable of adequately bearing so wide a range of thought and emotion.

F. L. Lucas whose *A Greek Garland* was published in 1939 would in general disapprove of the Flecker lines just read, for he says that "the common practice of rendering every couplet of the Greek into four or more short lines of English lyric seems to me, as a rule, to break the backbone of the original. For the Greek elegiac metre is nearer to epic than to lyric." Mr. Lucas prefers to retain a six-foot line of iambs and anapaests. The result is more dignity, somewhat after the manner of Tennyson, whom Lucas has edited, although with a great use of feminine end-rimes.

Where are the towers that crowned thee, the wealth that filled thy portals,
Thy beauty, Dorian Corinth, whereon men stood to gaze?
Thy proud dames sprung from Sisyphus, thy shrined Immortals,
Thy palaces, the myriads that swarmed along thy ways?
Not a trace, not a trace, unhappy has thou left behind in falling—
All has been seized and ravened by the wild throat of War.
We only, Ocean's children, are still left calling, calling,
The sea-mews of thy sorrows, along thy lonely shore.

For this noble lament the form is suited, as is Mr. Lucas' generally sombre, sometimes flat, poetic style. A distinguished scholar and critic, Mr. Lucas has written poetry of his own, and he has fine words to say of the Anthology, the book he would choose for desert island reading. In his *Critical Thoughts in Critical Days*, 1942, he says, "If I had to explain what poetry is to a Martian, I could choose no better type, not only of the poet's language, but of the poet's way of looking upon life. It can even stand translation. For it is not true that the best poetry cannot be translated:—only the best poetry can be translated—the poetry that depends not only on the music of words and their associations, but also on deeper things." This is high praise; but like Mr. Lucas' own style it is perhaps so lofty that it misses much of the lighter, more graceful in the Greek.

For this other side of the Anthology I think of Humbert Wolfe's *Others Abide*, 1928, and *Homage to Meleager*, 1930. His fragile, sweet style and short, light line is often pleasing:

Sweet is the smile of Lais. Sweeter still
The tears from eyes that will not, and they will.
For yesterday, when leaning at my shoulder
She sighed, though I did neither tease nor scold her,
And tears upon our lips, as fountains cool,
Fell on our kiss and made it wonderful.
But when I asked, the only answer was:—
"Because all men are faithless and because. . . ."

Obviously a minor poet, Wolfe belongs in that interesting line of busy British civil servants who find time and spirit to be poets or scholars on the side. One thinks at once of Austin Dobson to whom he is akin as a poet, or of another contemporary, that strange figure, the late Librarian to the Foreign Office Sir Stephen Gaselee. Wolfe's poetry is well characterized by this, his translation from Leonidas.

Not only does my little music stir
In summer heats the grateful traveller
With melodies unpaid, or with the dews
Paid that I sip in the tall avenues.
But on the spear of Pallas look! They set
The cricket, as the helmed one's amulet.
The Muses love me, and I trump their suit
With love of Pallas, who first played the flute.

J. M. Edmonds, Cambridge lecturer in classics, keeps perhaps closer to the original sense than does Humbert Wolfe; and his verse, although often precious, has also a

light touch. This, from his luxurious volume *Some Greek Love Poems*, 1929, is especially happy in spirit and style.

> Violet white and daffodilly,
> Myrtle-bud and laughing lily,
> Red hyacinth and crocus neat,
> All shall in one garland meet,
> And to her sweet locks honour lend
> With the rose, the lover's friend.

Another translator of the same period is marked at first only by some of the worst ills into which translation can fall. R. A. Furness's *Translations from the Greek Anthology* and *Poems of Callimachus*, both 1931, amply justify the fear of end-rime so frequently expressed by critics of verse translation, and his bad taste is only discouraging.

Such lines as this give little promise of delicacy:

> The siskins twitter shrilly; turtles too

A straining for rime results too often in awkward grammar or such jarring caesuras as these:

> Soft flowers in crimson meadows round you spring,
> Anacreon, with fourfold-clustering
> Ivy! White founts of milk, and wine as well . . .

Yet this very vulgarity fits the translator to deal somewhat more sympathetically with the satire and vulgarity of the Greek. I enjoy this for example, particularly the second stanza.

> Aristides used to keep
> One heifer and one woolly sheep;
> Such wealth sufficed (he had no more)
> To stave starvation from the door.
>
> He lost them both in quick succession:
> The cow succumbed in parturition;
> The sheep was eaten up by bruin
> And then the farmstead went to ruin.
>
> He took the strap that bound his wallet
> And knotted it around his gullet;
> And so in misery, beside
> A lowless, bleatless byre, he died.

Choicest of all is:

> The schoolmaster's daughter, seduced by her tutor,
> Gave birth to a masculine feminine neuter.

This reminds us at once of a translation of Lucian into limerick by that master of the form, Norman Douglas. This one, unlike most of Douglas' limericks, is fortunately quotable, coming from Birds and Beasts. . . .

> A philosopher called Stesichore
> Was bitten by fleas till he swore.
> So he put out the light,
> And said: "Now you won't bite,
> Because you can't see me no more."

Douglas says this is a verse form that would have appealed to Lucian. And of course any one interested in the Anthology in English will want to read Douglas' *Birds and Beasts* again to note particularly his many able verse translations as well as his pithy comments on other translators. His shrewd but warm comments on the Anthology in his relatively scarce *One Day*, privately printed in France in 1929, may not be so well known, but they are well worth looking into.

Thus far the examples we have listened to bring distinct echoes from Victorian or at most Georgian voices, with Tennyson, Swinburne, and Dobson very clear. There are however translations by truly modern poets. One is the San Franciscan Kenneth Rexroth, some of whose best, clear poetry is available in *The Phoenix and The Tortoise*, 1944. He has the skill of pungent brevity in his Anthology verse.

> Splendid ingenuity
> Went to the manufacture
> Of the water ousel's nest
> Hung beneath the waterfall
> It is built for a season.

> By themselves in the twilight
> The cattle came home
> Over the snow drifted hill.
> Profoundly asleep,
> The cowboy lies by an oak,
> Stricken by lightning.

> Eumelus had a Maltese dog.
> He called him Bull. He was the most
> Loyal dog that ever lived.
> His bark comes faintly up from Hell
> Lost on the night bound roads.

A new British annual publication called simply *Translation* promises to be valuable for our purposes. The second series, just issued, has this from the Anthology, by E. F. Watling.

Here sleeps a sailor,
Yonder a landsman lies.
One over land and sea
Death the destroyer flies.

To avoid what would to my mind be an anti-climax, I have left to the last the pleasure of reading from Dudley Fitts, whose exciting work as a translator of the classics must be known to all of you from his books and his work with BBC. I will content myself with a few selections from his *One Hundred Poems from the Palatine Anthology*, 1938. For his translation, or "free paraphrases" as he calls them, he has deliberately "chosen a system of irregular cadence, assonance, and the broken line." The poetic effect then is more subtle, and is marked particularly by a fine sensitivity to both the sound and the silence of language.

At the Tomb of Sophokles

Gently about this tomb wind gently O Ivy
where Sophokles lies
mingle your green with the rose
and the new tendrils of the gathering vine
soft-cluster
For his sake whose dark wise heart
shuddered with the glory of the Deathless Ones
who spoke through his fatal tongue

To Zeus of the Rains

Rain at night and the north wind whirling
And wine and the stumbling loneliness:
Moschos my fair love!
I cried . . .
(Trudge on, on, and never a friendly door
Down all the long street . . .)
I cried
Dripping with rain:
No end, O Zeus?
Dear Zeus, be gentle! *Were you not once in love?*

Epitaph to a Sailor:

Tomorrow the wind will have fallen
Tomorrow I shall be safe in harbour
Tomorrow
I said:
and Death
Spoke in that little word:
The sea was Death.
O Stranger
This is the Nemesis of the spoken word:
Bite back the daring tongue that would say *Tomorrow!*

Except for an occasional rather arrogant assent to cleverness, most of Fitt's work has the brilliance of true poetry in its own right, and this if it be the work also of an honest and capable scholar, as Fitts is, is the test of the finest translation.

Here then is a variety, a veritable *olla podrida*. What are we to make of it all? Which translator has best centered his shot? Fortunately, I think, we do not have to choose among them, for we need them all. No one person could be so manifold in his sympathies as to react with sensitivity to the whole range of the Anthology. This range is part of our delight in the Anthology; it adds to our delight in translations from the Anthology. It is in fact much of our delight in translation in general. As that fine translator C. F. MacIntyre says of one of his recent works: "Every man has his own Rilke. . . . I want now to isolate my own. . . ." From every good translation comes some new insight and appreciation, some variation on a theme already familiar—surely a classical mode.

ROMAN CURRENCY UNDER THE REPUBLIC

ACCORDING TO MOMMSEN (*History of Rome*, 1.565), the ancient Romans at first used cattle as a medium of exchange for money. An ox was rated as equal in value to ten sheep. Subsequently copper or bronze came to supersede cattle. But the copper coins which were issued were not stamped because the unit was a pound and that was too large and bulky to be made from a die. So the coins were simply cast from the smelted metal and put into circulation. But there was no coinage for the first three or four centuries after Rome was founded. Mattingly, in his Roman Coins, places the date about 300 B.C. The *Aes Grave* originated about this period. Mint officials and coinage came a few years later. When the Romans began to coin money, they borrowed the art from the Greeks, the Greek colonies in Italy having coined their money several centuries before; so their coins served as models for the backward Romans.

The unit of money the Romans adopted

was a heavy copper coin weighing a pound called an *as*. Though the Greeks used silver at the time, the Romans used copper; but the value of copper bore a certain ratio to silver, *viz.* 250 to 1, which was the ratio underlying the first issue of Roman money. Originally the copper *as* weighed 12 ounces; but the weight was not constant, fluctuating with the relative value of copper. So as the price of copper advanced the weight of the *as* diminished, going as low as two ounces, or even one. The *as*, therefore, came to be regarded simply as a unit of money.

The communities of central and southern Italy, probably under Greek influence, used a silver currency, being originally Greek colonies. Furthermore, they had no uniform system of coinage, each community being sovereign and issuing its own currency. After Roman influence became dominant in Italy, a general standard of money applying to the entire country was introduced; and the coinage of the currency became centralized in Rome (cf. Mommsen, *op. cit.* 1.574). Yet Capua still retained its own monetary system after a different standard and also minted some coins for Rome. This money is assumed to have been intended especially for circulation in Campania. This arrangement was more convenient for Rome since she had troops billeted in that district and her own copper currency was not readily available for circulation there in competition with Greek silver money. The Capuan minted money also tended to promote Roman commerce in Campania.

Silver money was introduced under Carthaginian auspices, according to Mattingly (*op. cit.*, p. 8). The silver money was the didrachm then current in Campania and weighed about 7.58 grams (cf. Mattingly, *op. cit.*, p. 6 and Frank, *Economic History of Rome*, p. 71). The rate of exchange of this silver coin with the copper *as* is not disclosed. However, copper later exchanged with silver at the ratio of 1 to 120, on which basis the didrachm was equal in value to three and a third copper or bronze *asses*. Later still the weight of the didrachm was reduced to 6.82 grams, presumably to bring it into balance with the prevailing rate of exchange. When this was done, the Greek cities reduced the weight of their didrachm. This fact indicates that they were acquainted with the established principle of what we call now Gresham's Law, *viz.*, inferior money tends to drive out of circulation money of superior value.

About 312 B.C., the Roman Government made a radical departure in its currency and reduced the weight of the copper *as* one half, thereby making the standard *as* just a half of a pound, and the fractional coins in the same proportion. Why the Government adopted this policy is not obvious. As that was a period of cleavage between the upper and lower classes of Roman society, some scholars have interpreted the act as an effort on the part of the Government to give some relief to the debtors. However, Mommsen interprets the act as indicating the State's policy from now on to relegate copper or bronze to the status of mere token money. But Frank (*op. cit.*, p. 73) rejects this view as unacceptable, since copper was still the standard money both for domestic and foreign purposes, and Rome did not possess sufficient silver to take its place. Probably a more logical explanation of the question at issue is that the increased demand for copper had advanced the price of this metal in the Mediterranean countries and Rome, her policy being to maintain bimetallism unimpaired, decided to meet the situation by reducing the weight of the *as* so as to keep her copper and silver money in balance. For it is an established fact that at that period all commodities had advanced in price, since inflation had set in after the return of Alexander, who had brought back vast treasures of silver and gold which found their way into circulation. Rome met the crisis by reducing the weight of the *as*, the standard coin by half. Thus, to meet the rising prices, Rome resolved to inflate her currency (cf. Mattingly, *op. cit.*, pp. 14 and 26).

Economic conditions continued to exert their influence on Roman coinage. For the *as* was subjected to still further reduction in size and weight in the Samnite wars; nor was this because copper was receding before silver

monometallism. The fact is, during those long protracted wars there developed an ever increasing demand for copper both for war purposes and domestic uses and the supply of that metal became still further diminished. Moreover, the demand became positively acute after the Etruscans and Gauls came to the help of the Samnites in 296 B.C. and the supply of copper from Etruria was cut off from Rome. Rome therefore had to fight to overcome the Etruscans and especially to recover the sources of supply of that metal from the mines of Etruria. By 280 B.C. Rome had succeeded in regaining access to the mines in dispute and the scarcity of raw copper was relieved. But before this was accomplished, the weight of the *as* was reduced to two ounces merely. Certainly that coin in the Roman monetary system then seemed to be veritable token money.

Pliny (*Nat. Hist.* 34, 34) informs us that, when in 280 the Romans captured the Etruscan cities of Volsinii and Vulci, they brought back as booty two thousand bronze statues. Furthermore, he records that a Greek author jokingly wrote that the Romans were making war for the love of art. With the Romans, however, that was no joking matter; for in their desperate need of copper it may be presumed that they soon melted down the captured bronze statues to supply their woeful shortage of copper. Rome was also waging war with Pyrrhus, which put a heavy strain on her resources. After the restoration of peace following the years of war against the Samnites, the Etruscans and Pyrrhus, the price of copper, as of other commodities, approached the normal of pre-war times, before the tide of inflation had set in.

Rome now came to be recognized as the dominant state of all Italy. Yet her currency system was outmoded and seriously inadequate to meet the needs of her expanding commerce. Consequently, the Government availed itself of this opportunity of those years of peace to institute a reform of its currency system. This was the year 269, after the defeat of Pyrrhus and the Greek cities in southern Italy. No doubt it was fitting and in keeping with the dignity and prestige of the State to coin its own money and not have Capua, now no longer a sovereign power, to mint the money it put into circulation. Accordingly, the Government decided to issue a new silver coin called *denarius*. The Government adopted the Attic pound in place of the old Oscan pound it had been using. Now the Attic pound weighed slightly more than the old Oscan pound, *viz.* 327 grams, and it was popular in Italy. The new coin was divided into 12 ounces of 24 scruples each. The old two ounce bronze coin, because of its convenience, was retained in the new system. Since the former ratio of copper to silver of 1 to 120 had been restored, the new two ounce bronze *as* was worth only one-sixth of the old *as*. The new silver coin weighing four scruples was the size of the Greek drachm, slightly heavier, and worth ten of the 48 scruple bronze *asses*. It was appropriately called the *denarius*, the ten-piece in the decimal system. The silver *quinarius* worth half of the *denarius* was of course issued at the same time. Another silver coin was also issued, a one scruple piece, worth two and a half *asses*, the *sestertius* in the new monetary system. Also fractional coins of the *as* were issued.

"The *denarius*, as its name implies," says Hill (*Historical Roman Coins*, p. 29), "was the silver equivalent of ten bronze *asses;* hence the mark of value on it (X); similarly the *quinarius* marked (V) and the *sestertius*, or *semi-tertius*, marked (HS), are the equivalents of five and two and a half *asses*, respectively. Let us for the moment assume that when the *denarius* was introduced, the weight of the *as* was fixed by law. The normal weight of the earliest *denarius* is 4.55 grams (four scruples). At the current ratio of 120 to 1, it would be equivalent to 546 grams of bronze, or ten pieces of 54.6 grams. The *as* at the time must therefore have weighed 54.6 grams, which is one-sixth (the *sextans*) of a pound of 327.45 grams."

This indicates clearly that the new system of coinage adopted by the State was of the sextantal standard. The *denarius* was at first intended to be the standard coin of the Italian possessions only, but with the extension of

the Roman dominions it circulated beyond the seas and eventually dominated the currency of the civilized world for more than five hundred years (Hill. *op. cit.*, p. 28). It still survives in the form of (*d*) as an abbreviation for the English penny.

The emblem the Romans adopted for the original *denarius* was a head of Roma with a winged helmet on the obverse side of the coin and on the reverse the *Dioscuri*, Castor and Pollux, charging. Later these symbols were replaced by Luna with two galloping horses or Victory in a chariot drawn by two galloping horses, on the obverse, and on the reverse a she-wolf suckling the twins Romulus and Remus. Another popular design for the reverse, was a ship's prow which indicates that this must have been after the victory off Antium in 338 B.C., when the bronze beaks of the captured ships were taken to the Roman Forum to adorn the front of the rostra.

After the State instituted the new monetary system with the coinage of silver, the silver mints in southern Italy gradually ceased to operate in the course of the following century—save Capua, which, with Rome's approval, issued silver coins of the old weight called *victoriati*. However, the *denarius* now was a trifle heavier than the regular Capuan coin; but Rome decided to stand the loss in competition in order to popularize the new *denarius* in her southern trade. The Capuan silver money issued with Rome's consent bore no mark of its value, but is believed to have exchanged with the *denarius* on a four to three basis. Pliny (*Nat. Hist.*, 33.44) records that the *victoriati* were regarded as *mercis loco* merely and not regular currency.

It is curious how later historians misinterpreted the currency reform act and generally regarded it as a deceptive device on the part of the State to debase the currency and save money for the treasury. So even Pliny (*op. cit.*, 33.44–45) and Festus (450.87,468) misconstrued the move, putting a sinister interpretation upon it. Probably they were influenced by the practice of emperors such as Nero, and others, who resorted to debasement of the coinage to enrich their coffers. As a matter of fact, the currency reform of 269 B.C. entailed a loss on the public treasury by issuing the silver *denarius;* because, as stated above, the new coin was heavier than the drachm issued by Capua with which it came into competition, entailing a differential loss which the State treasury absorbed. Both the silver *denarius* and the copper coins were issued at market value and were so equated, when minted, that the State made no profit by the transaction either in the payment of debts or otherwise. It is true that the new *as* was only a sixth of a pound; but the *as* itself was now regarded simply as a unit of money and debts were then equated in the intrinsic values of the new coins. Moreover, it may be assumed, the courts of justice, which had a proper regard for all property rights and scrupulously respected them, would not have permitted any shrewd trick such as debasing the coin to repudiate a debt. Debts incurred under the old currency system were doubtless reckoned in the determined values of the new *denarius* and *as* and settled accordingly.

Under the Republic the government was rather punctilious in maintaining the integrity of its coinage and made no departure from the rule except in dire crises; as in the Hannibalic war, when Rome's armies were annihilated by the Carthaginian general. Then the Government had to recruit new legions and equip them, to fortify the capital threatened by Hannibal, and to build new fleets. To meet a crisis such as confronted the State then, a great strain was made on the public treasury to expand the credit and increase the money in circulation. But after the emergency was passed conditions soon returned to normal and the credit of the Government was reestablished. However, a crisis like that of the war against Hannibal, fortunately occurred very seldom.

As indicated, Rome first began to coin silver in the year 269 B.C.; and for about 50 years the State maintained a double monetary standard, the silver *denarius* and the bronze *as*. This bimetallism continued till about 217 B.C. Then Rome resorted to another experiment in finance. Now the silver *denarius* was

worth about sixteen *asses* instead of ten, the *as* was reduced to one ounce, and gold was issued in pieces worth 20, 40 and 60 sesterces. The gold *aureus* was equal to 25 silver *denarii*. The sesterce took the place of the old *as* of four ounces in the currency reform of the year 269. After the old *as* of four ounces was withdrawn from circulation, the new sesterce became the unit of reckoning in business negotiations. After the revision of her financial system in 217 B.C., Rome operated on a monometallic basis, silver being the standard and copper coins thereafter recognized simply as token money. This practice continued in force during the remainder of the Republic. Under the stress and strain of the Hannibalic war the Roman Government put into circulation a *denarius* made of copper and plated with a thin coat of silver. This looked like fraud on the part of the State, but was not designed to deceive the public. (Cf. Heitland, *The Roman Republic*, Section 403, and Mattingly, *Roman Coins*, p. 93.)

The gold coins which were issued in the dire emergency did not remain permanently in circulation, being soon withdrawn by the Government. The State had comparatively little gold, and so was not prepared to continue gold coinage, which ceased shortly after the crisis was passed, approximately 202 B.C. This was Rome's first experiment in coining gold, and she did so then only to increase her scant supply of currency. Moreover Rome did not possess enough gold to venture to adopt it as a standard currency. Of course the silver *denarius* continued to be issued. But its size was somewhat diminished and it was valued at 16 *asses*. Thus the *denarius* depreciated in value and slipped off the decimal system of 1 to 10 whence it derived its name. As a result of this unfortunate occurrence, accounts henceforth came to be reckoned in sesterces, as previously indicated (cf. Mattingly, *op. cit.* p. 24). It is to be noted that the *as* at this time was reduced to one ounce, owing to the scarcity of copper, which was just half its former weight. As a result of the exigencies of the war, as above indicated, the scarcity of copper had caused the price of that metal to advance considerably. When in 80 B.C. the *as* was reduced to half an ounce in weight it ceased to be issued.

It is pertinent to quote Pliny's comment on this incident of currency reform in 217. He says (*op. cit.* 33, 45): "When Hannibal was pressing the Romans hard during the dictatorship of Fabius Maximus, the *as* was reduced to one ounce and it was agreed that the *denarius* should be rated at 16 *asses*, the *quinarius* at eight, the *sestertius* at four. Thus the State made a gain of a half, but in paying the wages of a soldier one *denarius* was to be given for ten *asses*." Pliny of course lived under the Empire, more than two centuries after the incident he mentions took place; and, in keeping with the spirit of the times, he put a sinister interpretation upon this act of the famous old dictator, Fabius Maximus.

Rome had a commission of three men appointed by the senate to control all public finances and to supervise and determine the issue of currency (cf. Mattingly, *op. cit.*, p. 29 and Heitland, *The Roman Republic*, Section 397). The S.C. stamped on the coins indicated the authority of the senate, who had original jurisdiction. The act creating this finance commission was called *Lex Minucia* and dated from 216 B.C. But the commission had no accurate method or means of determining either the time, or the amount of money to be coined and put into circulation. So the per capita circulation of money was quite irregular, and doubtless proved a considerable source of annoyance to business and the State.

When coinage came to be centralized in Rome, which occurred after Rome became supreme in Italy, the mint was kept in the temple of Juno Moneta—from which fact our word money is derived. Incidentally, this fact tends to confirm the theory that Carthaginian influence was a factor in Rome's adoption of a silver currency, Juno among the gods being favorable to Carthage from Trojan times. The business of striking the coins was under the direction of a commission of three men appointed by the Roman Senate called *triumviri monetales*. In early times Roman generals in the field and abroad issued money, having it struck as occasion, according

to their judgment, required, and stamping upon it their own names and portraits or *effigies*, by the authority of their *imperium*.

The process of minting was simple. One engraved die was placed on the anvil and another into the end of a metal bar. Between these two was placed the flan or blank roughly cast into the required shape and size and heated red hot. Then a blow with a heavy hammer on the upper end of the bar struck the coin, which was next removed by a pair of tongs, and the coin was ready for use. There was no milling or collar on the coin as in modern minting.

The earliest silver coins of the Romans bore only the word Roma or Romano with the mark of value on the obverse, and on the reverse the prow of a ship or some other emblem. Later the coins bore the name of one of the Roman gods on the obverse and on the reverse the prow of a ship was retained; or in place of this a bit of Roman history, or some other emblem deemed suitable for the occasion.

The Romans effected three imporant currency reforms under the Republic, *viz.* in 312, 269 and 217 B.C. However, it needs to be pointed out, as Mattingly observes (*op. cit.*, p. 92) that the Government never learned to accept the fact of a permanent war-debt, to be funded and repaid over a long term of years. The Romans preferred as an alternative a partial repudiation of the public debt, which they camouflaged and disguised under a show of currency reform. This was convenient for the State, no doubt, but disastrous to the individual. Yet, this subterfuge enabled the Government to save its face in maintaining a reputation for integrity in its monetary system. But in the last analysis it was a form of repudiation none the less, however cleverly disguised.

Under the Empire coins bore the effigy of the Emperor with his name on the obverse and on the reverse side the date or an inscription referring to some historical event. The senate ordered the portrait of Julius Caesar to be placed on the coins issued under his authority. The *as* bore the image of Janus, while the fractional coins were stamped on the reverse side with the figure of a ship's prow. These coins were called *semi*, with the head of Jupiter, equal to one half an *as*, *i.e.*, six ounces; *triens*, with the head of Minerva, one third of an *as*, four ounces; *quadrans*, with the head of Heracles, one fourth of an *as*, three ounces; *sextans*, with the head of Mercury, one sixth of an *as*, two ounces, and *uncia*, with the head of Roma, one twelfth of an *as*, one ounce.

The silver fractional coins were the *denarius*, equal to ten *asses* of four ounces (in our money worth 19 cents); the *quinarius*, equal to five *asses*, and the *sestertius*, equal to two and a half *asses*. These coins were denoted by the symbols X, V and HS, respectively. On the obverse appeared the head of Roma personified, wearing a winged helmet, and on the reverse side an image of the *Dioscuri* on horseback. Later, instead of the *Dioscuri*, appeared the figure of Diana Victoria driving a two-horse chariot, or Jupiter in a four-horse chariot.

The reform of the currency in 217 B.C. remained in effect throughout the remainder of the Republic. However, the value of the coins tended steadily to depreciate. The *denarius*, for example, the value of which was established at 17 cents (*i.e.* in our money), dropped to 15 cents and later still under Nero to 12 cents and in the second century to 6 cents. So in consequence of the steady depreciation of this coin the silver currency came to be classed as small money, and only the *denarius* and the *quinarius* were employed as silver pieces under the Empire. The copper or bronze coins, of course, continued in use.

Caesar struck a large number of the gold coin called *aureus*, equal in weight to one fortieth of a pound and in value to 25 *denarii*, or 100 sesterces (in our money $5.00). This gold piece came to be recognized as the standard coin under the Empire, but it depreciated in weight and value till 312, when Constantine fixed its value at one twelfth of a pound (about $3.00 in our money). The *aureus* then came to be popularly designated as *solidus*, a term that survives in the Italian *soldo*.

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DELIGHT

(*from page 77*)

know. But it is precisely here that pre-college education finds its great opportunity to promote the practice and aims of general education, for it alone can and must provide the prerequisites. Just as many of the general subjects are scientific and the schools help by providing their prerequisite, mathematics, so a large part of any humanities curriculum is drawn from foreign literatures, not least from Greek and Latin, and the schools can assist by teaching their students actually to read these languages. In the case of Latin, I believe that this is more than an opportunity; it is both a duty and a necessity; for the study of Rome, apart from its wider implications, is, as I have said, the very foundation of general education, at least in the humanities. In short, general education in the colleges requires the schools to reconsider their curriculum and their approach to their curriculum. In so far as the humanities are the life-blood of general education, more Latin rather than less is required of the schools, but chiefly a different and more liberal approach to the study of Latin.

Finally a word as to ends. It is a matter of some surprise that the United States, which is so wisely progressive in so many matters, is so firmly hidebound in its approach to classical education. It is now, it seems, a fact that the traditional classical education such as that, for instance, in England is a flower that will not bloom, at least in our generation, on these shores. It is as out of the question that American students will begin to learn Latin at the age of six and be done with grammar and Caesar by the time they are ten as it is that their university professors will expect them to render English into Latin and Greek prose and verse of different and appropriate styles and metres. The danger is that instead of being approached from a point of view that is suited to changed conditions, classical education will become an apologetic foreshortening or summary that is administered at the wrong age of a student's natural development. An illustration is not far to seek in the fate of scientific education in the Roman empire. The great Greek scientists, men like Archimedes, Euclid, Ptolemy, Diophantus and others, most of whom were not completely translated into Latin until well into the Middle Ages, were studied, if not in Greek, in Latin summaries. This process of summarization was so thoroughly done that Isidore, the Bishop of Seville, in the seventh century, considered the whole realm of science could be adequately covered in education by a summary of four pages. Yet a new approach to science which began to appear in the tenth and eleventh centuries has expanded those four pages into a subject that leads the field today.

Education, formal education, is essentially a process that is both interesting and full of delight, intellectual and aesthetic. When these two qualities are lacking, the process ceases to be one of education and becomes merely mechanical or vocational training. The delight of Latin, which is so varied and exciting, has nothing to do with mechanical or summarized training. By restoring delight to our curriculum, we shall begin to kindle and satisfy the enthusiasms of our classic pilgrims.

NOTES

[1] Aristotle, *Poetics* 1448b 13–17.

[2] *Ibid.*, 1448b 17–19.

[3] Quoted from W. H. Graham, *Gibbon's Decline and Fall*, The Contemporary Review, Vol. 170, August 1946, p. 108. Mr. Graham appears to have added the last sentence himself, presumably from some rare text of the *Memoirs* or from some other source in the *History*.

TRENDS

(*from page 62*)

one has made an error? And isn't it the main busi- of a good teacher to handle this process wisely? As for the second argument: a good teacher directs her pupils how to study and gives them directions by which they may avoid pitfalls as they study at home. It is this editor's opinion, after nearly a half century of teaching Latin in secondary schools and universities, that it is not home work that creates resentment (which I believe is minimum), but misdirected and aimless

teaching in the classroom. Latin teachers with good programs of work are likely to have hopeful pupils, because their pupils can see and understand the aim and purpose of their work. And as for the third argument: What is meant when one says a pupil learns too slowly? What is the standard of speed? The argument is still good that a pupil learns by doing, and if he tackles a task that is not beyond his strength and performs that task well, the time element is of little moment.

So much for the negative approach. Let's be positive. Two important arguments occur to this editor. Home work should be retained in our schools because the high school graduate must do a lot of home work when he enters college. He should have learned well how to study by himself and to think independently. And the ability to think independently is going to stand him in good stead even if he does not go to college. Even the superlatively successful businessman who pays others to do his thinking for him must have done considerable independent thinking in order to reach his plush-upholstered office.

Then again it is the part of a child's education to attempt a task and make a report to his teacher of the result. That is particularly true of language study and doubly true of an inflected language. It is very good training, for instance, for the pupil to attempt to write some Latin. It doesn't matter essentially whether he makes errors in inflection and grammar. What does matter is whether he made a good try and got good guidance before he made the try. And, lest the editor seems to be speaking too confidently, he has had experience supervising study and knows its potence and its impotence.

Now what is the scape-goat in all this quandary? TELEVISION. Educators, as always, are trying to find an easy way out of the dilemma where things are in a whirl in a TV-ridden home. It seems to us that this matter immediately becomes a Parent-Teachers Association job. Let parents and teachers get together on it, since it principally concerns them, and let professional educators bother their heads with less important problems.

We See By the Papers . . . .

Edited by John F. Latimer

It is with some amazement—and perhaps concern—that the writer finds himself as listed above. Delay in making the final decision was not caused by lack of interest but by certain unpredictables whose outcome could not be known long in advance. Although the deadline for this first copy is desperately near, it must and will not prevent expression of sincere thanks to Professor Haight for her courtesy in acting as "guest columnist" for the first issue, and to the *Editor* for his kindness in extending the extra leeway.

Anyone who is familiar at all with classical literature and who reads even but sparingly in current magazines and newspapers must be constantly struck by the many classical references and allusions. The judicious and instant cutting out and mailing in of these references is earnestly solicited. They will provide a steady source of material which could continue to be of value and interest to readers of this column. They will provide another link between the past, both remote and near, and the ever-becoming present, and help the present occupant preserve the pattern so capably set by his predecessors—Professors Salyer and Steiner.

THE "SOCRATIC" HOUSE

Speaking of patterns, the influence of Socrates on modern architecture may have escaped attention. This influence may be seen in many of the "picture window" houses being built all over the country. An article about one such house in the Washington, D. C. area appeared in *The Evening Star* last August 11 under this caption: " 'Socratic' House for Family of Eight Based on 2,000-Year Old Principle." In commenting on the "single-slope" roof, one of the distinguishing features of the house, Harry E. Ormston, the architect, said: " . . . it has been recognized for thousands of years that it is better to have the south side of the house higher than the north side, so that the run's rays from the south can penetrate the interior in the winter time."

Mr. Ormston cited the pertinent passage from Xenophon's *Memorabilia* (3.8.8–10) "to show that the contemporary use of the solar principle is not a 'modern' innovation, but rests on a traditional concept having its basis in truths arrived at as long ago as the days of Socrates, who died in 399 B.C." In a telephone conversation Mr. Ormston gave credit for his reference to an article

on "Insolation" which appeared in *Pencil Point* (Feb. 1944).

Undoubtedly Socrates would feel at home in the "modern" house, and recognize its utilization of his principles. For a briefer mention of them see Xen. *Oec.* 9.4.

INTERLINGUA

BRIEF MENTION of the Interlingua-English Dictionary will perhaps not be out of place in this column. The following facts and quotations are taken from a review of it by Waldemar Kaempffert (*New York Times*, Sept. 23, 1951).

The dictionary, compiled under the editorship of Dr. Alexander Gode and issued by Storm Publishers, New York, for the International Auxiliary Language Association, contains 27,000 words, of which 10,000 are of the general vocabulary type and the rest scientific and technical.

The language of science and engineering, derived largely from the Greek and Latin, is the basis of Interlingua, . . . (as the following passage will show): "Energia es necessari pro toto que occurre in le mundo. In tempores passate le plus grande parte del energia applicate esseva fornite per le fortia muscular del homines e del animales domestic." The original reads: "Energy is necessary for everything that happens in the world. In olden days most of the applied energy was furnished by the muscle and brawn of men and domesticated animals."

Soon to be published is a grammar based on that of the Romance languages and "so simple that any intelligent person can learn it in a day or two." Will this be a new teaching field for Latinists?

MORE ABOUT THE SUN

The "Topics of *The Times*" in the New York *Times* is a fruitful source of material for this department. That of Sept. 23, 1951 is even richer than usual. In commenting upon President Conant's prediction "that by the end of the century the sun will be the main source of energy for industry," the writer drew upon several classical authors for illustration and comparison. After stating that "the sun is also the source of such human energy as is displayed on the earth, for it produces the food by which men exist," he added: "The dwellers in Plato's cave had no idea what life was like until they left their cave and came out into the sunlight." (See *Republic* 7.514a–520d) The next paragraph must be quoted in full:

Father of those who are still seeking the secrets of the sun was Anaxagoras, who ventured to tell the Athenians that the sun was not a god driving a chariot and four across the sky but a mass of molten metal somewhat larger than the Peloponnesus. It took all the eloquence of Pericles to save his friend from severe punishment for this and similar un-Athenian views on the nature of the universe (Cf. Lucretius: *De Rerum Natura*). Anaxagoras went into exile, while the Athenians continued to argue about how Helios, the sun god, transferred his golden chariot and immortal horses from west to east every night. The people of Rhodes went on to build the Colossus (about 280 B.C.) in honor of the sun god and centuries later Roman Emperors were still trying to force the cult of *Sol Invictus* upon their disillusioned subjects.

If scientists can learn how to utilize the free and unlimited energy of the sun, scientists, like President Conant, may "look forward to another, if not golden, then silver, age when deserts will bloom, food will be plentiful and all nations will enjoy an adequate place in the sun." (For all except the last idea see Hesiod's *Works And Days*: 106–201, and Vergil's *Fourth Ecologue*.)

ARISTOTLE ON WOMEN

THE THIRD oldest college in the United States is entering upon a new epoch. This year for the first time in its 255-year history St. John's College in Annapolis, Maryland has opened its doors to women. Only a few of them were admitted—24 to be exact—but that was enough to start the enthymemes flowing.

Not all of the men were opposed to the female intrusion on their male domain. One, however, was quoted by the Washington *Post* (Sept. 23, 1951) as stating flatly: "A woman just can't cope with this program." He was referring of course to the "Great Books" curriculum for which St. John's is famous. To prove that a woman's mind "isn't made that way," the unappreciative male called upon Aristotle as witness: "Woman is more compassionate, more jealous, more querulous, more apt to scold or strike . . . more void of shame and self-respect, more false of speech, more deceptive . . . more difficult to rouse to action."

At the last report St. John's was still coed. Aristotle notwithstanding.

BOOK REVIEWS

MENANDER

EDMONDS, J. M., *The Samia of Menander:* The Augmented Text with Notes and a Verse Translation. Cambridge, Deighton, Bell & Co., Ltd. (1951), 41 pp.

IN THE FIELD of New Comedy, the most sensational news since the discovery of the Codex Cairensis is Edmonds' announcement of "an interlinear paraphrase and marginal scholia in the Cairensis of Menander." The brief work under review here is an edition of the *Samia* with a rimed English translation and the Greek text of the paraphrase (with a translation) for those sections of the play where Menander's text has not been preserved.

A preface of eight lines states that announcement of the discovery has been made in *The Phoenix* (the journal of the Classical Association of Canada). Actually, at the present writing, this has not yet appeared in *The Phoenix*, but, the reviewer understands, will appear in a special volume of that journal in honor of Professor Gilbert Norwood, which will be published probably this fall. Edmonds dedicates his edition of the *Samia* to Sir Ellis Minns, "who saw there was writing there." Sir Ellis Minns is the Disney Professor of Archaeology, Emeritus, of the University of Cambridge, and onetime University Lecturer in Palaeography. Other scholars, of course, have seen nothing "there," and ordinary photographs, such as those published by Lefèbvre, seem to reveal nothing.

The new material here presented consists of some two pages of Greek text, a few scholia, and various "stage directions" interspersed among Menander's lines (including interesting references to the *prothyron*). In general, the *Samia* remains much the same play as that reconstructed by scholars, but many divergencies could be listed from the detailed reconstructions such as the recent one by T. B. L. Webster. The new material includes a cast of characters of the play (which adds the wife of Niceratus to the list usually assumed) and a didascalic notice (by which the play is dated 308 B.C., considerably later than the date usually assumed). The paraphrase itself is cast in the form of staccato dramatic conversation. No notice is taken of choral interludes or, apparently, of a prologue. Other peculiarities may be observed: Vocatives are used *ad nauseam*, and at the ends of speeches, which are extremely short, a vocative regularly indicates the next speaker. There is a great deal of description of "stage" action given by the characters speaking. An awkwardly large number of characters seem to be on scene at the same time. Finally, why should a paraphrase be necessary for the simple style of Menander, and if one was to be made, why was not the paraphrase for the text of a given page written on that page?

All these strange features may be explained if we assume that we have here not a paraphrase in the strict sense of that term but rather an adaptation of Menander's comedy for presentation by a single mime. Most unfortunately, Edmonds has not presented a photograph of the script in this edition and has said nothing concerning the date of the script. If the script is ancient (that is, presumably, fifth or sixth century), the present reviewer suggests that such an adaptation is what we have. There are many indications which prompt the reviewer to this conclusion, but considerations of space and the fact that more of Edmonds' data will soon be available forbid here the extended discussion and documentation which the reviewer hopes to present elsewhere. Certainly the "paraphrase" is written in the style of a very inferior Herondas in prose. We should not be too severe in judging such an adaptation, however, because Menander's comedies are much more complicated than those simple sketches of Herondas or Theocritus which were apparently designed for recitation by a

single performer. Naturally, it would be difficult for a single individual to present such a plot in conversational form to a popular audience, and the frequent use of vocatives to distinguish the many characters would be indispensable. They are frequent in Herondas and Theocritus. We have long known, of course, that such individual performers were popular, especially in late antiquity; we have known, too, that comedies were later adapted for certain types of popular entertainment (e.g. Athenaeus 621D).

The possibility, then, that we have here a unique example of such adaptation—even though the genre is a very lowly one—adds interest to this new material. It is important, therefore, that a photograph of the script and all the "paraphrase," not merely that which deals with the lost portions of the play, should be published as soon as possible. Menandrean scholarship will stand still until the date of this new material has been firmly established, and the matter thoroughly studied. This is not, however, to intimate that the new material adds much to our appreciation of Menander. Menander's forte is the deft portrayal of character in action: we are charmed by his delicate humor, his pathetic ironies, and his beautifully chaste style. But the reconstructions of his tortured plots, even if certain, do not add greatly to our estimate of his genius.

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PERIEGESIS

WACE, ALAN J. B., *Mycenae: An Archaeological History and Guide:* Princeton, University Press (1949). Pp. xviii+150; 110 plates (with maps, plans, and illustrations). $15.00

THE AUTHOR, formerly Director of the British School at Athens, is now Professor of Archaeology at Farouk Ist University in Alexandria. One of the pioneers in the field of "Prehistoric Greece," he with Blegen first devised the term Helladic for the Bronze Age civilization of the Mainland. His wide experience in excavating sites from Thessaly to Lakonia particularly qualifies him to write of the Helladic Bronze Age and especially to describe the great site of Mycenae. Here he dug from 1920–1923 and in 1939 carried on a systematic study of the great Tholos Tomb. For thoroughness in presenting the evidence from a site, it would be difficult to surpass this work. Having been associated with Mr. Wace at two excavations, at Zygouries and at Mycenae, the reviewer can attest the scrupulous gathering of the evidence and the attention to detail, which characterized the work of this great excavator and scholar.

A copy of this "Guide" has been donated by Mr. Wace and placed in the "Inn of the Fair Helen of Menelaos" and modern *Mykenai*, where the visitor may avail himself of this informative guide and interesting reading. The versatility of Mr. Wace—who can discourse authoritatively on "prehistoric" pottery, Classical Sculpture, Modern Greek embroideries, et al.—is further shown in Chapter I, where he describes the land and scenery, flora and fauna of the Argolid. His colorful description of birds, plants, and flowers of the region will delight many a reader.

"The Setting," "Pausanias on Mycenae," "The Chronological Framework," "The Types of Mycenaean Tombs," and "The History of Mycenae" are headings of the first five chapters. The dating necessarily is mostly relative, though links with Egypt permit a more absolute dating at certain points. The sequence of the different periods and sub-periods is fixed archaeologically, but the dating of their limits is subject to fluctuation as fresh evidence becomes available, states the author.

Chapter IV, "The Types of Mycenaean Tombs," deals with the five main types of tombs found at Mycenae: pit graves, cist tombs, shaft graves, chamber tombs, and tholos tombs. Each type is described and illustrated and likewise their contents. One should also note a former work by Mr. Wace, *The Chamber Tombs of Mycenae* (1932). Among the contents of the tombs are tools, weapons, vases, jewelry, dress, and equipment of this life and for the after-life. Notable

are the remains of dogs' skeletons, which reminds the author of the two hounds which Achilleus slew on the pyre of Patroklos.

No Neolithic remains have so far been discovered at Mycenae but the three great periods of the Bronze Age are quite plentifully represented by pottery particularly, but also by architectural remains. The chronological scheme is approximately as follows: Early Helladic ca. 3000–2000; Middle Helladic ca. 2000–1600; Late Helladic ca. 1600–1100 B.C. The last period is divided into LH I, II, and III and the last, LH III, the Mycenaean Age *par excellence*, is further subdivided into LH III A (early and later stage,) LH III B, and LH III C. "From soon after the middle of the twelfth century . . . the Bronze Age gradually developed into the Early Iron Age."

The Classical Period is scantily represented for the Argives captured and depopulated Mycenae ca. 468 B.C. The third century saw the rise of Mycenae as a dependency of Argos, and Hellenistic remains of houses and pottery attest this last occupation of the site.

The "guide-book" proper includes Chapters VI to XIII. In these seventy pages, the reader is conducted all over the lower (unwalled) city and through the akropolis or walled citadel. In this systematically "conducted tour," the visitor will cover all the remains of Mycenae and receive a detailed description of the walls, houses, tombs, palace-complex, and the numerous finds. The accompanying plans are indispensable for a clear understanding of some of the structures, particularly of the palace.

Chapters VI–VIII deal with "The Site Outside the Citadel." Setting out from the "Fair Helen," one follows the modern road and sees to the right the "Cyclopean" bridge and on the left several rock-cut chamber tombs. Farther on, one leaves the road to visit on the left the greatest, most elaborate, and fortunately the best preserved of the Tholos Tombs of Greece. Mr. Wace for convenience designates this as the "Treasury of Atreus," the name which the traveler Pausanias (ca. 160 A.D.) probably received from the local guide of his day. Locally it is called the "Tomb of Agamemnon." At the excavations, the "Atreus Tholos Tomb" was the convenient name for this superb example of architectural engineering, which the author would date ca. 1330 B.C.

Several pages and numerous plans and photographs as well as Appendix I (pp. 119–131) are devoted to this tomb, a structure which elicits praise from architects and engineers of today because of the size and accuracy in workmanship of the carefully joined blocks of conglomerate. The corbelling of this great domical structure, nearly forty-eight feet in diameter and over forty-four feet high, has been worked out with such skill that a great amount of careful planning and mathematical calculation must be postulated for its construction.

Farther on, near the Akroplis, are the tholos tombs of "Klytaimnestra," of "Aigisthos," and the "Lion's Tomb." The remaining five of the nine Tholos Tombs of Mycenae are on the ridge to the west and southwest of the Akropolis. These also are described and illustrated by plans and photographs. Also north of the village of Mykenai (formerly Charvati), is the hill of Kalkani. Here are the remains of early settlement and the rock-cut tombs whose construction and contents have been exhaustively treated by Mr. Wace in his work, *The Chamber Tombs of Mycenae* (1932).

On Mt. St. Elias, northeast of the akropolis, Mr. Wace has found traces of a "Mycenaean" outpost. Here "the lords of Mycenae maintained . . . a watch to observe fire signals from other similar posts, as told by Clytemnestra in Aeschylus' *Agamemnon*," and here, adds the author, may have blazed the fire signal about the fall of Troy.

Chapters IX–XIII (pp. 49–101) are devoted to a systematic study of the remains on the akropolis or citadel. The walls, built after 1350 B.C., average twenty feet in thickness and in places originally were nearly sixty feet in height. The Lion Gate, at the northwest corner, is probably the best known Bronze Age monument in all of Greece. This gate and the small Postern Gate in the north wall provide the only means of access into the citadel.

The Shaft Graves, enclosed by the later-built circular wall of two upright slabs, lie beyond, and inside of, the Lion Gate. Their discovery by Schliemann in 1876 marks one of the epoch-making discoveries in the entire field of Archaeology, and the contents of the Shaft Graves with their profusion of gold objects justifies the Homeric epithet, "rich-in-gold," for Mykenai. (The six Shaft Graves are to be dated ca. 1650–1500 B.C.)

After describing the Shaft Graves and the remains of houses uncovered south of the Grave Circle—among them the House of the Warrior Vase, the author conducts the reader to and through the great Palace on the highest part of the Akropolis. This extensive structure is described in great detail and here the author shows his keen eye and remarkable ingenuity in reconstructing for us the ramifications of the palace-complex. One must consult the plan (Figure 4) to follow the description of the portals, rooms, and corridors. However, one may easily recognize the Grand Staircase with its first flight of twenty-two steps, the Throne Room, Great Court, and the oblong Megaron, the most characteristic feature of the Helladic (or "Mycenaean") palace.

The Megaron, facing westward onto the Great Court (ca. 40×50 feet), consisted of a porch, vestibule and main room (ca. 39×44 feet). The latter contained in the center a fixed hearth surrounded by four columns of wood, which stood on stone bases. The floors were of cement, bordered by white gypsum slabs, and the cement was covered with stucco on which were painted colorful designs in the fresco technique. The walls of the Megaron were covered with stucco and decorated with fresco paintings, now in a fragmentary condition. The original decoration must have presented a gaily colored appearance with designs and figures in red, white, blue, brown, black, green, and yellow.

A doorway in the north wall of the porch gave access to rooms, corridors, a second floor over the Megaron, and to a bath with a red stucco floor. "Since the discovery of this bath, modern local tradition at Mycenae has made this the scene of Agamemnon's murder and invoked the red color as confirmation!" The apartments of the royal family lay in the section immediately north of the Megaron, and adjoining were the rooms of the official or state section. Still farther to the north was the domestic section. At the northwest corner of the palace was a portal which because of its modest size may have been used by members of the household. The Grand Staircase at the southeast corner of the Palace must have been the official entrance used by embassies and on great state occasions.

In the northern side of the palace were storerooms and a shrine. In the latter were found beads, ornaments of gold, and other objects. Especially noteworthy is an ivory groups of two female figures with an infant boy, "the finest Mycenaean carved ivory yet found at any site."

The great period of the Palace coincided with Late Helladic III, ca. 1400–1150 B.C. It naturally underwent alterations, reconstruction, and redecoration during the two or more centuries of its existence. Finally it was looted and burned, and traces of the great conflagration are visible in the Megaron, the Grand Staircase, and elsewhere. This would be the destruction brought about by the Dorian Invasion about 1150–1100 B.C.

The rest of the citadel is described in Chapter XIII and includes the House of the Columns, the Secret Cistern (fed by underground terracotta pipes from the Spring Perseia about 300 metres to the southeast), the Postern Gate, and the walls. The House of the Columns, situated below and east of the Palace, is considered by Mr. Wace to be the most important house of the Bronze Age yet excavated—excepting, of course, the palaces at Tiryns and Mycenae. In the course of his description of it, the author cites eleven apposite passages from the *Odyssey*. As in the case of the Lion Gate, so the Postern Gate in the north wall has a projecting bastion so arranged that the attackers would have to expose their right and shieldless side to the defenders on the wall.

A valuable feature of this book is the summary which the author gives of our present knowledge of "The Mycenaean Civilization,"

which is the heading of Chapter XIV. In seventeen pages Mr. Wace discusses the life and civilization of the period about 1400–1200 B.C., "when the civilization pictured by Homer flourished." Houses, implements, utensils, arms and armor, clothing, gold and silver ornaments, food, roads, draft animals, hunting, trade and industry, arts and crafts, political organization, religion, writing, and the intellectual side of life—all are discussed. The result is a picture of a people living in a highly developed state of culture.

There is only indirect evidence as to their religion but it seems to have been polytheistic with a mother goddess as the principal figure. The intellectual side of life receives some light from the architectural achievements which presuppose careful planning, accurate measurements, and the calculation of the strength of materials and of thrusts and strains. Writing was known but probably only by priests, scribes, and other learned persons. Nothing is known of a literature though it seems likely that forerunners of the Homeric epics may have already existed in this last period of the Bronze Age (ca. 1400–1100 B.C.).

These "Mycenaeans" were "skilled craftsmen, imaginative artists, capable organizers, able engineers and architects, all evidence of considerable intellectual power." Furthermore, they were *Greeks* (or *Hellenes* as they were called in the Classical period and on down to modern times). As Mr. Wace concludes, the Mycenaean civilization represents "the earliest expression of the Greek genius."

After three Appendices, a Bibliography and the Index, the book concludes with 106 figures (Nos. 5–110), which are really Plates each with two or more figures on them. In Appendix 1, "The Date of the Treasury of Atreus," the author convincingly demonstrates that this great Tholos Tomb is to be dated in the later half of the Fourteenth century. If his date, ca. 1330 B.C., seems a bit late to some, certainly his presentation of the evidence throws out of court the argument of the few "Minoans" for a date around or before 1600 B.C.

The great walls of Mycenae are dated "about 1350–1330 B.C." on the basis of the evidence presented in Appendix 2, "The Date of the Cyclopean Walls." [The walls, made of huge, more or less shapeless boulders with the interstices chinked with smaller stones, made such an impression on the later Hellenes that the tradition arose that the walls had been built by the Cyclops, giants from Asia Minor. An analogous case is that of the Hebrews who, impressed by the megalithic monuments of the Neolithic people, ascribed the dolmens and menhirs to giants. Such may be the explanation of Genesis 6:4, "There were giants in the earth in those days."]

Thirteen different kinds of stone are represented in the buildings and among the decorative objects at this site, and these are described in Appendix 3, "The Stones of Mycenae." Also discussed here are the four tools—hammer, chisel, drill, and saw—which were used in working the stones.

In producing this happy combination of the scholarly and the interesting, Mr. Wace has made a great contribution to Archaeology and History. Scholar and layman, student and tourist, all will appreciate this valuable history and guide of the great site, made famous by Agamemnon and Homer, made known by Schliemann and Wace.

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Notice to Reviewers

Some two dozen reviews are still outstanding from those promised Professor Salyer. Most of the books in question deserve some notice however brief. The delinquent contributors are reminded, therefore, that their names are recorded in the Review Editor's filing system.

They are also reminded that brevity (about two double-spaced pages) is now preferred. But brevity is only a suggestion. If a book is important or deserves extensive praise or censure ample space may be utilized.

Grundy Steiner

MATHEMATICS

(*from page 74*)

De VIII tollas VII et remanet VI, believed by editors to be a late insertion. The text reads:

> Nunc mihi iam credas, fieri quod posse negatur,
> Octo tenes manibus, sed me monstrante magistro
> Sublatis septem reliqui tibi sex remanebunt.

The same riddle is to be found on page 172, line 30 of Beeson's *Mediaeval Latin Primer*, where Alcuin puts to his pupil Pippin the problem, "Vidi hominem octo in manu tenentem et de octonis rapuit septem, et remanserunt sex." Pippin answers succinctly, "Pueri in schola hoc sciunt." The answer to this has been presented independently by M. Froehner for Symphosius and by Professor Eva Sanford for Alcuin.[43] It is, as is not unusual in such cases, simple enough when explained. If a person with his two last fingers lowered for 8 raises the little finger, the one which by itself indicates 7, he now has his hand in the proper position for 6.

NOTES

[1] In addition to the works on special topics mentioned throughout the notes, the following will be found worth consulting:

Smith, D. E., *History of Mathematics* (Boston, 1925), Vol. 2, *Special Topics of Elementary Mathematics*, definitely the best available introduction to the history of elementary mathematics; it is well illustrated and to be recommended for browsing.

Friedlein, Gottfried, *Die Zahlzeichen und das elementare Rechnen der Griechen und Römer und des Christlichen Abendlandes vom 7. bis 13. Jahrhundert* (Erlangen, 1869), still the most comprehensive work on the subject.

Smith, D. E., *Mathematics* (*Our Debt to Greece and Rome*, no. 36) (Boston, 1923), well worth reading for its many interesting bits of information.

[2] Edwards, Walter A., "What we don't know about the Romans," THE CLASSICAL JOURNAL, 41 (1947–48), 325–329.

[3] See passages mentioned and discussed throughout this article, especially at the conclusion.

[4] A problem from Frontinus, *De Aquaeductibus*, 26, will serve to illustrate the complexities sometimes encountered in the use of duodecimal fractions. For the calculations which follow I am indebted to Friedlein, *op. cit.*, 91. Frontinus makes the statement that the *unciae modulus* (diameter $1\frac{1}{2}$ *digiti*) has a capacity of $1+\frac{1}{6}+\frac{1}{72}+\frac{1}{72}\cdot\frac{1}{12}$ *quinaria*. One *quinarium* is the capacity of the *quinarius modulus* (Diameter $1\frac{1}{4}$ *digiti*). The procedure which must be followed to reach the above conclusion is (a) to find the squares of $1\frac{1}{3}$ and $1\frac{1}{4}$ and (b) to divide the square of the second into that of the first.

(a) Squares:

$$1\tfrac{1}{3}\times 1\tfrac{1}{3}=1+\tfrac{1}{3}+\tfrac{1}{3}+\tfrac{1}{9}=\tfrac{16}{9}=\tfrac{256}{144}$$

$$1\tfrac{1}{4}\times 1\tfrac{1}{4}=1+\tfrac{1}{4}+\tfrac{1}{4}+\tfrac{1}{16}=\tfrac{25}{16}=\tfrac{225}{144}$$

(b) Division:

$$\frac{256}{225}=1\frac{31}{225}=1\frac{248}{225\times 8}=1\frac{225+23}{225\times 8}=1\tfrac{1}{8}+\frac{23}{225\times 8}$$

$$=1\tfrac{1}{8}+\frac{828}{225\times 288}=1\tfrac{1}{8}+\frac{675+153}{225\times 288}$$

$$=1\tfrac{1}{8}+\tfrac{3}{288}+\frac{153}{225\times 288}=1\tfrac{1}{8}+\tfrac{3}{288}+\tfrac{2}{3}\cdot\tfrac{1}{288}.$$

The reason $\frac{1}{8}$ is selected is that 8×31 is the first product of 31 higher than 225. $\frac{1}{72}\frac{1}{12}$ is the *scripulum*, one of the named duodecimal fractions.

[5] Horace, *Ars Poetica*, 326–330.

[6] Published by Friedlein, Gottfried, "Der Calculus des Victorius," *Zeitschrift für Mathematik und Physik*, 16 (1871), 42–79. A brief description of the contents of the section illustrating multiplication will give an idea of the scope of the rest. These consist of 49 tables showing the results when the digits (1–9), the tens (10–90), the hundreds (100–900) and 1000, as well as fractions going as low as $\frac{1}{144}$ (*dimidia sescle*) are multiplied by each of the numbers from 2 to 50.

[7] Spitzer, F. H., "The abacus in the teaching of arithmetic," *Elementary School Journal*, 42 (1942), 448–451.

[8] Vol. 2, 107.

[9] Heath, Thomas, *A History of Greek Mathematics* (Oxford, 1921), Vol. 1, 38.

[10] Some of the more accessible among the many articles written on this subject are: Bechtel, Edward A., "Finger counting among the Romans in the Fourth Century," CP 4 (1909), 25–31; Richardson, Leon J., "Digital Reckoning among the Ancients," *American Mathematical Monthly* 23 (1915), 7–13; Sanford, Eva Matthews, "*De Loquella Digitorum*," CJ 23 (1927–28), 588–593; Smith, D. E., *History of Mathematics*, Vol. 2, 196–201; id., Article "Finger Notation," *Encyclopedia Americana*, 1943 ed.

[11] Plautus, *Miles Gloriosus*, 204–206; Pliny, *Hist. Nat.* 34, 33 (cf. Macrobius, *Saturnalia* 1, 9, 10; Suidas *s.v.* *Ἰâνος*,; Cicero, *Ad. Att.* 5, 21, 12–13; Quintilian, *Instit. Orat.* 1, 10, 35.

[12] For reference to passages other than those mentioned in the course of this article the reader should consult the *TLL s.v.* digitus I, A, 2, c as well as the articles of Bechtel and Richardson mentioned above. Greek references from Herodotus and later, in addition

to Roman, have been collected in Sittl, Carl, *Die Gebärden der Griechen und Römer* (Leipzig, 1890), 252–259.

[13] Jones, Charles W., *Bedae Pseudepigrapha: Scientific Writings Falsely Attributed to Bede* (Ithaca, N. Y., 1939), 106–108; *cf.* 53–54. This edition of the pamphlet is based on a collation of two early MSS and a third as represented by the text in Migne, *Patrologia Latina*, 129, 1349–50. This collation reveals two widely diverging traditions, which differ not merely in form, but in substance as well. An examination of as many as possible of the five remaining manuscripts listed by Jones will be necessary before we have a dependable text (or texts).

[14] Jones, Charles W., *Bedae Opera De Temporibus* (Cambridge, Mass., 1943), 179–180; cf. 329–331. This is the first truly critical edition of this work of Bede, based on complete collation of ten selected manuscripts and partial collation or examination of 94 others. Forty-five of these were written between 70 and 100 years after its composition.

Reproductions of manuscript illustrations may be found in Burnam, John M., *Palaeographica Iberica* (Paris, 1912–25), 3, Plates XLI–XLIV (1–90,000); 2, Plate XXIX (100,000–1,000,000) from Madrid, Biblioteca Nacional A16 (19) (*ca.* 1130 A.D.). (The figure for 2000 has been copied in Smith, *History of Mathematics*, 2, 197 and in *Encyc. Brit.*, 14th ed., *s.v.* Finger Numerals); Cordoliani, A., *Bibliothèque de l'École des chartes*, 103 (1942), Plate II (opp. p. 65), showing 30–500 from Paris, Bibliothèque Nationale, MSS Lat. 7418, apparently a copy of the Madrid MS; Hermann, H. J., *Die deutschen röm. Hss.* (Leipzig, 1926), Plate V (reference from Jones, *op. cit.*, 330), facsimile of Vienna MSS 12600 fol. 23 showing positions for higher numbers. Smith, *op. cit.*, 198–201 illustrates three other mediaeval systems. These illustrations are reproduced in part in *Encyc. Brit.*, 14th ed., *s.v.* Numeral. See also Wüstemann, E. F., *Neue Jahrbücher für Philologie und Pädagogik, Suppl.-band*, 15 (1849), 2, 511–515 and Plates I–IV which seem to be based on illustrations from J. Aventinus, *Abacus atque vetustissima veterum latinorum per digitos manusque numerandi . . . consuetudo* (Nuremberg, 1522) which contains the first printed edition of this chapter of Bede.

[15] Tannery, Paul, "Notice sur les deux lettres arithmétiques de Nicolas Rhabdas," *Notices et extraits des mss. de la Bibliothèque Nationale*, 36 (1886), pt. 1, 121–252 (reprinted in Tannery, *Mémoires scientifiques*, IV, *Sciences exactes chez les Byzantines* [Toulouse and Paris, 1920], 61–198. The date of Nicolaus is established conclusively from his second letter; see Pauly-Wissowa-Kroll, *s.v.* 'Ραβδᾶς. A description of his system may be found in Heath, *op. cit.*, vol. 2, 551–552.

[16] Frhöner, Wilhelm, "Le comput digital," *Annuaire de la société Française de numismatique et d'archéologie*, 8 (1884), 232–238 and Plate IV (wrongly labelled III). An illustration showing the obverse of the *tesserae* representing 8 and 9 is to be found in Bailey, Cyril, ed., *The Legacy of Rome* (Oxford, 1923), 295. These are in the British Museum, but not certainly from Pompeii as stated in Bailey. Fröhner illustrates the reverse of the former of these as bearing IIIV which he interprets as a retrograde VIII. I am, however, informed by R. A. Higgins of the British Museum that it actually reads INV, but that the crosspiece on the N is perhaps a little thinner than the other lines and could be a modern addition. Both, as Mr. Higgins has kindly informed me, are 2.8 cm. in diameter (The corresponding measurements of our 25 and 50 cent pieces are approximately 2.4 and 3.0 cm. respectively).

[17] Suidas, *s.v.* 'Αρβαξάκιος.

[18] Macrobius, *Sat.*, 7, 13, 10. The *tessera* reproduced by Fröhner has all fingers erect, but the index finger separated as far as possible from its neighbour. As Fröhner points out, this must be a mistake since, according to all other evidence, the fingers left erect do not count, and therefore we have no number at all represented. The term *medicus* or *medicalis digitus* seems to have come from the practice on the part of doctors of using this finger in conjunction with the thumb to lift pinches of various materials; see Niedermann, Max, "Sprachliche Bemerkungen zu Marcellus Empiricus *de medicamentis*," *Festgabe Hugo Blümner* (Zurich, 1914), 329–330.

[19] *Adv. Iovinianum*, 1, 3 (Migne, 23, 223); quoted in substantially the same words, *Ep.* 49 (48), 2 (*Corp. Vind.*, 54, 353–354); mentioned *Ep.* 123, 9 (Migne, 22, 1052) and *Comm. in Evang. Matthaei*, 2, 13, 23 (Migne, 26, 92). See Bechtel, *loc. cit.* (note 10). For 60 add Cassiodorus, *In Psalm. 60 concl.*

[20] *Apologia*, 89. Nicolaus' instructions are slightly different in that he speaks of the thumb as held in the same position but bent like capital gamma.

[21] *Instit. Orat.*, 11, 3, 117.

[22] Here Nicolaus' instructions are that the thumb should be laid across the palm to the base of the middle finger and the index hocked over its lower part.

[23] 10, 248–249; cf. Jerome, *adv. Iovinianum*, 1, 3 (and other references in note 19); Augustine, *Serm.* 175, 1; 251, 7; *Tractatus in Iohannis Evangelicum*, 122, 7; Sidonius, *Ep.* 99, 16; Cassiodorus, *in Psalm. 100 concl.*; Cassianus, *Conlatio*, 24, 26, 7 (*Corp. Vind.*, 13, 707).

[24] *Apologia*, 89, *si triginta annos pro decem dixisses posses videri computationis gestu errasse, quos circulare debueris digitos aperuisse. Aperuisse* is the reading of the later MSS, the two early readings quoted by Helm in the Teubner edition are *adperisse* and *apisse*. The suggestion, unsupported by outside evidence, that the gestures for these numbers might have been somewhat different in Apuleius' Africa and Bede's England, was made by H. E. Butler in *Classical Review*, 25 (1911), 72–73.

[25] Dessau, *Inscr. Lat. Sel.*, 7478 (*C.I.L.* IX, 2689). The precise interpretation of the idiom used in the last remark is doubtful, but we may be fairly confident that a comic effect was intended. The relief was in the Louvre at the beginning of the present century after a mysterious disappearance from Naples and has been reproduced in various pictorial dictionaries, e.g. Baumeister, A., *Denkmäler des Klassischen Altertums* (Munich and Leipzig, 1885–88), fig. 2373; Schreiber, *Atlas of Classical Antiquities* (London and New York, 1895), LXII, 12. It should be noted that the figures seem to have their

right hands extended, rather than their left as we should expect.

[26] See Bechtel, *loc. cit.* and the *TLL s.v. calculus*, II, A, 2; *computo* I, A, 1; *digiti* I, A, 2, c.

[27] Note 11.

[28] Pliny, *Ep.* 2, 20, 2–5.

[29] The most thorough discussion of the ancient abacus is Nagl, Alfred, "Die Rechentafel der Alten," *Sitzungsberichte der Kais. Akademie der Wissenschaften in Wien, Phil.-hist. Klasse*, 177 (1914), abh. 5 (also published separately) to which the reader is referred for evidence for statements made throughout this section, unless otherwise directed. See also Nagl's article in Pauly-Wissowa-Kroll, *s.v. abacus* (9) (*Supplementband* 3, 4–13) and, for the history of the abacus, Smith, *History of Mathematics*, Vol. 2, 156–196.

[30] All the examples of the word listed in the *Thesaurus, s.v. abacus* have other and more natural interpretations.

[31] *Thesaurus, s.v. calculus.*

[32] This is less strange in the light of the fact that almost no identifiable examples of the counting tables in wide use in Europe down to the beginning of the 17th century have survived although many of the counters or jetons are in existence. See on this subject Barnard, F. P., *The Casting-counter and the Counting-board* (Oxford, 1916).

[33] Nagl, "Rechentafel," 15–18; Smith, *op. cit.*, 162–168. Smith's identification of the abacus pictured on page 167 as from the British Museum is apparently wrong; for I am informed that there is no Roman abacus in their collection.

[34] See either article cited in note 29.

[35] *Psammites*, 3, 6.

[36] *Eutocii Comm. in Dimensionem Circuli* in Archimedes, Ed. J. L. Heiberg, Vol. 3, 272–273.

[37] Examples of these problems with explanation may be found in Heath, *A History of Greek Mathematics*, Vol. 1, 57–60; Gow, James, *A Short History of Greek Mathematics* (Cambridge, England, 1884), 49–53.

[38] Examples of multiplication and division involving fractions may be found in Nagl's article in Pauly-Wissowa (note 29) or (in greater detail) in Friedlein, *op. cit.*, 89–90.

[39] In Theon of Alexandria's commentary on the *Almagest* of Ptolemy, edited by Rome, A., *Studi e Testi*, 72, 461, 1–462, 17 (reprinted with translation in *Selections Illustrating the History of Greek Mathematics*, ed. Ivor Thomas [*Loeb Classical Library*] [London, 1939], Vol. 1, 50–53).

[40] Catullus, 5.

[41] Levy, Harry L., "Catullus, 5, 7–11 and the Abacus," *AJP* 62 (1941), 222–224.

[42] E.g., Martial, 2, 28; Juvenal, 10, 53; *Priapea*, 56.

[43] See notes 16 and 10.

PROGRAM

THURSDAY, NOVEMBER 22

10:00 A.M. President Russel M. Geer, Tulane University, *Presiding.*

1. Charles D. Perry, University of Alabama, "Horace and His Friends"
2. Mary F. Tenney, Newcomb College, "Theocritus and St. Joseph's Altars" (10 min.)
3. D. M. Key, Birmingham-Southern College, "The City-State and the American City—a Comparison" (15 min.)
4. J. L. Rose, Duke University, "Was Odysseus Afraid?" (15 min.)
5. Wallace E. Caldwell, University of North Carolina, "Names"

2:00 P.M. Maclean Auditorium, Presser Hall, Agnes Scott College. Annabel Horn, Wesleyan College, *Presiding.*

1. Jonah W. D. Skiles, University of Kentucky, "Rethinking Objectives"
2. Ivy M. Holland, Lexington High School, Lexington, Tennessee, "A Syntax Study: Some Spanish Locutions with Latin Origins"
3. Gladys Laird, P. K. Yonge Laboratory School, University of Florida, "*Inter Alia*" (10 min.)
4. Laura Rhodes, New Bern High School, New Bern, North Carolina, "Character Building Through Latin"
5. W. L. Carr, University of Kentucky, "The Much Abused Imperfect Indicative in Latin" (15 min.)
6. B. L. Ullman, University of North Carolina, "The Status of the Classics in the South"